DUDLEY KNOX LIBRARY
NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA 93943-5002

LIABILITY ISSUES OF THE DESIGN PROFESSION

BY

RICHARD O. GAMBLE II

A REPORT PRESENTED TO THE GRADUATE COMMITTEE
OF THE DEPARTMENT OF CIVIL ENGINEERING IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF ENGINEERING

UNIVERSITY OF FLORIDA

SUMMER 1986

T230484

ABSTRACT

Reducing professional liability risk is a subject that is continually being discussed in the medical, legal, and insurance professions as well as the design profession. Since no profession has successfully shifted or limited its risk, it is now recognized that the only sure method of reducing professional liability risk is through improved services. This report examines many of the liability issues facing the design profession today, then discusses how to perform services in such a manner that the associated liability risks are reduced. First, the duties of the design professional are outlined, which is followed by an examination of design services contracts, design phase services, and construction phase services. This report concludes with a discussion on resolution of disputes and professional liability insurance. Since all of the issues discussed are applicable to both architects and engineers, the suggestions in this report can be implemented throughout the design profession.

I wish to dedicate this report to my wife, Nadine,

who not only assisted in its preparation,

but has also given me tremendous moral support

during my brief Graduate career at

the University of Florida; and to our son, Ian,

who has brought new joy to our lives.

TABLE OF CONTENTS

Chapter I - Introduction 1

Chapter II - Design Ethics and Law 3

2.1 Ethics 3
2.2 Obligations to the Client 4
2.3 Obligations to the Public 4
2.4 Negligence and the Normal Standard of Care and Skill 5
2.5 Competition for Design Services 6

Chapter III - Contracting for Design Services 8

3.1 General Contract Considerations 8

3.1.1 Relationship Between Contracting Parties 8
3.1.2 Elements of a Contract 10
3.1.3 Authority to Contract 10
3.1.4 Importance of a Written Agreement 11
3.1.5 Contract Interpretation 12

3.2 The Design Services Agreement 13

3.2.1 Client Selection 14
3.2.2 Types of Design Services Contracts 14
3.2.3 Standard Forms 16
3.2.4 Nonstandard Forms 18
3.2.5 Contract Provisions 19

3.2.5.(a) The Basic Fee 19
3.2.5.(b) Changes and Fees for Extra Work 20
3.2.5.(c) Schedules 21
3.2.5.(d) Cost Limitations 21
3.2.5.(e) Warranties and Guarantees 22
3.2.5.(f) Responsibility Without Control 23
3.2.5.(g) Clauses Transferring or Limiting Risk 23

Chapter IV - The Design Phase 26

4.1 Developing Design Alternatives 26

4.1.1 Establishing the Assumptions and Requirements 27
4.1.2 Deciding Between Alternatives 27
4.1.3 Cost Limitations 31

4.2 Specifications 33

4.2.1 Types of Specifications 33

4.2.1.(a) Boilerplate 34
4.2.1.(b) Technical Specifications 34
4.2.1.(c) Descriptive Specifications 35
4.2.1.(d) Performance Specifications 36
4.2.1.(e) Open Specifications 37
4.2.1.(f) Closed Specifications 38
4.2.1.(g) "Or Equal" Clauses 39
4.2.1.(h) Product Approval Standards 39
4.2.1.(i) Reference Specifications 40

4.2.2 Writing Specifications 41
4.2.3 Precautions in the Use of Specifications 44

4.3 Working Drawings 46

4.3.1 Types of Working Drawings 46

4.3.1.(a) Detail Drawings 47
4.3.1.(b) Assembly Drawing 47
4.3.1.(c) Installation Drawing 47
4.3.1.(d) Diagram 47
4.3.1.(e) Construction Drawings 48
4.3.1.(f) Structural Drawings 48
4.3.1.(g) Maps and Topographical Maps 48
4.3.1.(h) Schedules 49

4.3.2 Common Features of Working Drawings 49
4.3.3 Developing Working Drawings 50
4.3.4 Reviewing Working Drawings 51

4.4 Design Aids 52

4.4.1 Computer Aided Design 53
4.4.2 Consultants 56

4.5 Documentation 57

Chapter V - The Construction Phase 59

5.1 Designer-Owner Relationship 59
5.2 Shop Drawing and Submittal Review 61
5.3 On-Site Observations 64
5.4 Certifications 67
5.5 Change Orders 68
5.6 Record Documents 70

Chapter VI - Resolution of Disputes 72

6.1 Claims 72
6.2 Litigation 74

6.2.1 Liability 75
6.2.2 Drawbacks of Litigation 76

6.3 Arbitration 78

6.3.1 How Arbitration Differs From Litigation 79
6.3.2 Advantages and Disadvantages of Arbitration 80
6.3.3 Mediation 80

6.4 Statutes of Limitations 81

Chapter VII - Liability Insurance 83

7.1 Types of Professional Liability Insurance Policies 84
7.2 The Insurance Policy 85

7.2.1 The Basic Coverage 85
7.2.2 Exclusions 87
7.2.3 Premiums 88

7.3 The Insurance Crisis 89

7.3.1 Facts on the Crisis 89
7.3.2 Alternatives 90

Chapter VIII - Summary and Conclusion 93

8.1 Ethics and the Law 94
8.2 Contracting for Design Services 95
8.3 The Design Phase 96
8.4 The Construction Phase 97
8.5 Resolution of Disputes 99
8.6 Professional Liability Insurance 100
8.7 Conclusion 101

References 103

CHAPTER I

INTRODUCTION

In past years, the design profession has been held to be virtually infallible. Few people questioned the designer's judgements or decisions regarding the selected design, the type of specifications used, or the administration of the construction. Construction projects were straightforward, so the contracts for design services were simple. There was not a need to carefully analyze each clause for potential liability risk. The responsibilities of each of the parties were clearly understood, and the designer's liability was limited to the construction parties, and was determined by the well established normal standard of care.

Today the liability of the designer is being broadened regardless of the contract terms, traditional interpretations, or known intent of the parties to the contract. Privity is no longer a prerequisite for a liability suit, so contractors do not hesitate to sue designers for delays or damages that could be attributed to the design. Third party suits are becoming more common, indicating that the general public is increasingly placing responsibilities on the designer. He has also become liable to the owner for much of the lack of performance by any and all participants in the construction project. For example, the designer is held liable for inadequate inspection when the contractor failed to build the project in accordance with the plans and specifications. Therefore, the tendency is to force the designer to eliminate, or else bear, many of the risks encountered on a construction project.

In order to avoid such risks, many designers have used exculpatory language and indemnification clauses to shift the risk to another. These methods are only partially effective. They are also contrary to today's public opinion since they tend to indicate that the designer is trying to avoid responsibility for not using the normal standard of care and skill in developing the design. Therefore, they are generally not looked upon with favor by the courts.

The question then arises, how does one handle the responsibilities, and control the liabilities, that are being placed on the design professional? The only effective method for handling the liability issues confronted in the design profession is to improve the services provided. To maintain his success, the professional must be made aware of the various liability issues, and then determine how he will approach such issues in providing his services. This report examines the typical services provided in a linear construction project, beginning with a brief discussion on ethics, the designer's duties and responsibilities, and the issue of negligence. Next, the report explores the various liability issues that can arise during the contracting, design, and construction phases of a project, and discusses how these services can be improved. The report finishes up with a discussion on the advantages and disadvantages of the various methods for resolving disputes, and an examination of professional liability insurance. All of these issues and discussions can be applied to both the engineering and architectural professions. Therefore, once becoming aware of the issues discussed in this report, one should be able to identify the liability risks of the entire design profession and establish procedures for limiting those risks.

CHAPTER II

DESIGN ETHICS AND LAW

2.1. Ethics

"Engineering is an important and learned profession. The members of the profession recognize that their work has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness and equity, and must be dedicated to the protection of the public health, safety, and welfare. In the practice of their profession, engineers must perform under a standard of professional behavior which requires adherence to the highest principles of ethical conduct on behalf of the public, clients, employers, and the profession." This statement is the preamble to the Code of Ethics adopted by the National Society of Professional Engineers (NSPE) in 1978, and outlines the conduct expected of the design professional. The Code goes on to state in the Fundamental Canons that the engineer shall "hold paramount the safety, health and welfare of the public in the performance of their professional duties; perform services only in areas of their competence; and act in professional matters for each employer or client as faithful agents or trustees." This Code, in its entirety, establishes the ground rules of the design professional's moral conduct, yet there is no penalty at law for a violation of the ethics.[49] However, the courts have begun to recognize certain representations of the design professional that closely resemble some of the provisions of the Code. First, the professional represents that he possesses the requisite skill and knowledge to perform the intended

services. Second, the professional will use reasonable care and diligence in the application of his skill and knowledge, and will be guided by his best judgement in all decisions and actions. Finally, the professional will be honest. These representations establish the legal ground rules for the design profession. They do have the potential for penalty at law, in that failure in any of these representations could result in the design professional being found liable for any damages incurred.[50]

2.2. Obligations to the Client

In addition to the above representations, the professional has certain duties to the client which may be established by contract or by law. The design professional has a duty to provide a design suitable for the intended use, with the requisite structural stability and weatherability to protect the client and his property, and which meets the standards set by the community in order to safeguard life, health, and property. Since these duties are recognized by the courts, failure to uphold them could result in the designer being found negligent in his duties. Furthermore, if the professional has the required skill and does not use it, or performs services for which he does not possess the skill, he could also be found negligent.[50]

2.3. Obligations to the Public

The Code of Ethics states that the designer's "primary obligation is to protect the safety, health, property and welfare of the public."[49] This obligation is also recognized by the courts in two main areas: 1)

development of the plans and specifications, and 2) administration of the construction. If negligence in the preparation of the plans and specifications can be proved, then the courts have determined that the passage of time does not necessarily grant immunity. As stated in *Inman v. Binghamton Housing Authority* (143 N.E. 2d 895), if the defect in the design is not patent or discoverable, then the designer will be liable.[50] As a result, the number of suits against designers has been rising, indicating that society is increasingly placing responsibilities for their protection on designers.[17]

2.4. Negligence and the Normal Standard of Care and Skill

In establishing negligence, the courts look to the "standard of reasonable care and skill" that is typical of the profession. If the professional represents himself as an expert, then this standard can be greater. This standard is described in the Code of Ethics as "conformity with accepted [design] standards." How are "accepted [design] standards" established? Usually, it is up to the jury to determine standards as a question of fact, with expert witnesses providing the basis for judgement. There have been a few cases wherein the plaintiff has asserted that the designer should be held strictly liable for design defects under what is commonly called the MacPherson Doctrine as established in *MacPherson v. Buick Motor Company* (111 N.E. 1050). This doctrine states that the manufacturer of an inherently dangerous chattel, defectively made, can be held liable for injuries to third parties.[50] However, design services do not fall into the classification of a chattel. This was clarified in a Minnesota

case, *City of Mounds View v. Walijarvi*, in which the judge stated that the designer could not be held strictly liable for inadequate services since there is no implied warranty of fitness for intended purpose of a design. To be held liable, the designer must first be negligent. The judge went on to state that there are numerous random factors that influence a professional's judgement, so he should not be held strictly liable until such time as all random factors are eliminated.[25]

2.5. Competition for Design Services

A final area for discussion on the topic of ethics and the law is the area of competition for design services. In the past, the various Codes of Ethics have strictly forbidden price competition for design services. However, in 1978, the United States Department of Justice determined that all practices used to avoid competition were in violation of the Sherman Anti-Trust Act, and the design societies could no longer forbid the practice through their Codes of Ethics. The design profession asserted that professional contracts require a high degree of skill and knowledge, and the exercise of care to use these skills in the best interest of the client.[50] Therefore, if work is obtained by low bid, sufficient attention may not be used, and the designer will be likely to prepare hasty and incomplete contract documents and detailed specifications that may be lacking. The designer also may not incorporate the best materials or design procedures, all of which would lead to more costly construction,[10] and the best interests of the public not being served. These arguments were to no avail, and the professional organizations were required to delete all prohibitions

of competitive bidding. Instead, in order to clarify misunderstandings concerning the Supreme Court decision, the various organizations issued statements declaring that " the Sherman Act does not require competitive bidding," and that designers "may individually refuse to bid for [design] services."

In light of the above, how are contracts for design services awarded? Frequently, to by-pass competitive bidding, a potential client will publish a notice stating that he is seeking services, listing the type of work, and asking for submissions of proposals. The client will then review the proposals and resumes, selecting the most qualified to provide a personal presentation and further evidence of their capabilities. He then selects the design firm that best meets his requirements and negotiates a contract.[10]

The Federal Government follows a procedure very much like the one described above. Under the Brooks Bill, passed in 1972, negotiations are conducted on the basis of "demonstrated competence and qualifications for the type of professional services required and at reasonable prices." Design firms submit annual statements of qualifications. When a project falling within their qualifications comes up, the Government selects at least three to examine further based on those qualifications and possible interviews. These three or more firms are then ranked. The number one firm is asked to submit a proposal, and negotiations are started. If a contract cannot be reached, negotiations are terminated, and started with the second choice.[47] This type of procedure eliminates the problems of competitive bidding while insuring a reasonable cost for design services.

CHAPTER III

CONTRACTING FOR DESIGN SERVICES

3.1. General Contract Considerations

Before a design professional can enter into a contract for design services, he must fully understand the contracting procedure and its legal implications. He must be able to identify the various elements of a contract and be able to communicate his duties and responsibilities in contract language. He must understand the relationship of the various parties to the contract and be able to identify provisions that should and should not be included in the contract. He should also be able to determine the type of contract that is appropriate for the project in question. This chapter will discuss many of these considerations.

3.1.1. Relationship Between Contracting Parties

The contract between the design professional and the client/owner is an important document that can determine whether a project is or is not successful. Prior to formulating such a document, the parties should fully understand the type of relationship that will best serve all parties during the life of the contract. Both parties are responsible for communicating in good faith and fair dealing, for the client-designer relationship is a fiduciary relationship based on trust and confidence. For the relationship to be successful, each party must believe in the undivided loyalty of its fiduciary. The client must trust the professional as an adviser and be

confident that he will receive honest professional advice. All discussions between them should be open and candid, with no fear of the other divulging confidential information.[47]

The fiduciary type of relationship may be contrasted with the adversarial and arm's length type of relationship that is typical in the world of commerce, and will generally exist between the client and the contractor. In this type of relationship, each of the party's first responsibility is to look after its own interests as a matter of survival. In the fiduciary relationship between the client and the designer, the designer must consider the client's best interests at all times. The designer should not accept kickbacks or bribes from any source, and should keep separate any funds that the client may give to him for holding. Whenever a financial opportunity arises as a result of services, the information should be immediately divulged to the client. Closely associated with this would be conflicts of interest, such as financial interests in anyone bidding the job, or in manufacturers, suppliers, or distributors whose products may be specified. It must be remembered that, if collusion between the designer and the winning contractor is proven, the contract can be set aside and the designer dismissed. To avoid misunderstandings on any of these points, the tendency has been to construct longer and more detailed contracts. As a result, the design professional must exercise care when contracting for design services.[47]

3.1.2. Elements of a Contract

When drafting a contract of any type, the initial step is to insure that all of these elements are present:[13]

Agreement-Offer and acceptance
Competent parties
Consideration
Lawful purpose
Proper form

"Agreement" is present if an offer from the designer to provide design services is accepted by the owner. "Competent parties" are present if the ability to contract is not limited, as in infants or insane persons; and they have the authority to contract, as in corporations and governments. Mutual consideration must be provided: the designer will give services as outlined in the agreement and the owner will provide payment. As long as the scope of services is not against public policy, or in violation of government statutes or common law, the element of lawful purpose will be satisfied. Finally, the proper form, be it oral or written, must be used in accordance with the applicable statutes and regulations.

3.1.3. Authority to Contract

As mentioned above, there must be at least two competent parties to a contract in order for it to be valid. Related to this element is whether or not the party signing the contract has the authority to bind the organization which he represents. If the prospective client is a sole proprietor, then he

will undoubtedly have the authority to contract for his business. However, an agent representing the owner may not have that authority, since such a contract will usually be a major transaction for the sole proprietorship.

If the prospective client is a partnership, usually only the partners will have contractural authority. In some cases, the partnership may have assigned the duties of contracting to one or more partners, or possibly an agent. If an agent has approached the design professional, he would do well to obtain a written authorization from the partners that he has contractural authority. If the partners are signing the agreement, it is desirable for all of the partners to sign.

Corporations are legal entities that can contract if formed, or registered as a foreign corporation, within the state in which the contract exists. It will be able to contract within the provisions of its articles of incorporation and bylaws. These two documents will also state who within the organization has contractural authority for the corporation. Before signing an agreement with a representative of a corporation, the design professional should review the articles of incorporation, the bylaws, and the authorization for the project to insure that the representative is authorized.[47]

3.1.4. Importance of a Written Agreement

Frequently, a design professional will enter into an oral agreement for services. This practice should be avoided if at all possible for a variety of reasons. First, the contract for services may fall under the provisions of the Statute of Frauds if it cannot be completed within one year. This is a

typical characteristic of large projects where the designer contracts not only for the design services, but also for construction services. Secondly, an oral agreement may not leave both parties with the same understanding of the scope of work, responsibilities, or conditions. In this case, parol evidence would be required to settle any disputes, and the dispute would become a contest of credibility with potentially disastrous results. Thirdly, if the client were to die, testimony regarding the contract could be barred. Finally, the designer may not be compensated for work begun before a contract was signed if the terms of the contract cannot be determined and the project is abandoned.[50]

3.1.5. Contract Interpretation

Under normal circumstances, the parties to a contract are able to interpret the provisions of a contract with the same meaning and to their mutual benefit. However, should this not be the case, the courts will utilize several factors in determining the intent of the parties. Initially, the actual language of the agreement will be examined. The language will generally be given its "plain meaning," which could lead to a third interpretation from the jury. If the language of the agreement is ambiguous, then the court may allow discussions prior to the agreement, called parol evidence, to be entered. The courts may then examine the facts and circumstances surrounding the making of the agreement, and the conduct of the various parties after the agreement became effective. Finally, the customs of the trade may be examined. If the design professional has documented the formation of agreement and the actions of the various

parties following the agreement, these factors can result in a favorable decision.

Another consideration in interpreting a contract is the form. If the client is inexperienced in design, and the designer provided the agreement, the courts will tend to interpret the contract against the designer and consistent with the expectations of the client. For this reason, it is advisable to carefully draft the agreement, eliminating all ambiguous language, and not rely on parol evidence, regardless of how well the discussions were documented.[47]

3.2. The Design Services Agreement

The design services agreement outlines the duties and responsibilities of both the design professional and the client to each other and to third parties,[8] reduces the risks of miscommunications and misunderstandings, apportions risks for the project between the client and designer, and provides a basis for resolving disputes.[51] The extent of detail within the contract will determine the type of relationship between the client and designer, advisor or agent. If the contract is broad in nature and the client inexperienced in such transactions, the designer may be assumed to be an agent who makes decisions on behalf of the owner. If the contract is detailed, then the designer will be construed as an advisor and consultant, with the owner making all decisions.[51] The difference in relationships can greatly influence the standard of care required of the designer in the performance of the contract.

3.2.1. Client Selection

The design professional should be selective with whom he contracts for services. Some would contend that the professional has no choice in clients, that the client selects the designer. To a certain degree, this is true. The client will approach different designers of his choice to request the desired services, but the designer is not required to provide those services if he does not believe them to be in his best interest.

In selecting the client, the designer should first open a line of communication and obtain details on the nature and extent of the desired services. From this the designer can outline the expected amount of fees and the method of payment. The design professional should then determine the financial capacity of the client, along with any prior experiences with him, such as difficulties in obtaining payments, lack of cooperation, or tendency to litigate with designers. Finally, the designer should insure that he has the training, capacity, and experience to provide the required services. If the answer to any of these questions is negative, then the project could be risky, and the designer will have to weigh the advantages with the risk of loss to determine if it is a desirable contract.[6]

3.2.2. Types of Design Services Contracts

Once the design professional has decided to provide the desired services for the client, he must then determine the type of contract to use. One of the oldest and most used types is the fixed percentage contract. With this type of contract, the designer is compensated based on a percentage of the

total cost of construction, as estimated from the final design. This method of compensation has received a great deal of criticism recently because of its disadvantages. First, there is no negative incentive for the designer to produce an economical design, and he is seemingly awarded for producing a costly design by receiving higher compensation. On the other hand, if the client should make major design changes during the construction phase, there could be added engineering work without additional compensation unless provided for in the contract.[10] For these reasons, the fixed percentage contract is losing popularity.

A type of contract that is commonly used when the design effort can be clearly and specifically defined is the fixed fee contract. As indicated by the name, this type of contract establishes a specific amount of compensation at the outset of the contract. Since the degree of expertise and thoroughness is directly related to the amount of money spent on the design, the amount of compensation should be determined by the consulting firm after having evaluated the total design effort required and the required levels of experience to provide an accurate design. This type of contract could be used in competitive bidding for design services. However, as previously discussed, a low bid could end up with an unsafe design or a greatly overdesigned structure.[10] The design professional should be careful to provide the client with an objective and accurate estimate, regardless of whether the client intends to use the estimate in price competition or not.

If the amount of design effort cannot be accurately defined, as in rehabilitation work, a preferable type of contract is the cost plus fixed fee. The compensation for this type of contract can be determined in one of two ways. The compensation can be based on a given amount per manhour

expended directly on the design plus a fixed amount for overhead expenses, or it can be the actual amount of salaries, fringes, and operating costs plus a percentage for overhead and profit.[10] Both methods require extensive documentation of the actual design effort expended.

A final type of contract, the contingency contract, can be any of the types discussed above and should be avoided if possible. With this type of contract, the compensation, and possibly the execution of the entire contract, is contingent upon a future event. This future event could be a successful bond election, the granting of a loan, or the receipt of a grant. With a contingency contract, the client is usually anxious to begin the design work, but does not want to sign a contract until the contingency occurs, so he places the risk on the designer by including the contingency in the contract. Frequently, the clause will read something like, "It is further agreed that the Owner is not obligated for payment under the terms of this agreement until project financing (or other contingency) has been arranged by the Owner."[30] This leaves the contingency completely controlled by the owner. If the designer begins work he can be placed in a weak bargaining position should the event not occur in that he will have accomplished the work, but will not be entitled to any compensation. This situation can lead to bribery and payoffs on the part of the designer in order to insure that the contingent event occurs.

3.2.3. Standard Forms

Several organizations publish standard contract forms for use in the design profession. Typical of these forms are those published by the

American Institute of Architects (AIA) and the National Society of Professional Engineers (NSPE). The AIA and NSPE documents are the result of extensive deliberations in which designers, owner's representatives, contractors, legal counsels, and insurance experts participated. The documents attempt to describe as extensively as possible the rights, duties, and obligations of each party in light of modern practices and customs, while establishing an equitable balance between the interests of the several parties.[30] Such documents are widely understood and can be a valuable time saving device for the designer. Though they are prepared by one party, they are not contracts of adhesion. The designer does not impose a "take it or leave it" condition upon their use. The parties are not required to use them and are free to modify them as desired.[47]

Despite their many advantages, the design professional should be cautious when using standard documents. Since the standard documents are so widely used, designers will tend to become lax in their use,[4] or become too reliant on the language contained within the forms, and will fail to modify the form for the particular project. Though it is fairly easy to find court interpretations for the various provisions of the standard forms,[13] if they are improperly modified and used, the court may interpret the contract significantly different than expected.

Another problem that can arise from the use of standard forms is the unauthorized practice of law. If the designer advises his client on how to use or modify the forms, he may be giving legal advice and may be held liable for the unauthorized practice of law. It is therefore advisable to engage legal counsel, and to recommend that the client also engage legal counsel, when using standard forms. In addition, the AIA and NSPE forms

have included a clause on the front of each document reading in essence, "THIS DOCUMENT HAS IMPORTANT LEGAL CONSEQUENCES; CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS MODIFICATION OR COMPLETION."[24]

3.2.4. Nonstandard Forms

As discussed above, the design professional should use standard forms, with appropriate modifications, whenever possible. Unfortunately, some owners may insist upon using nonstandard forms of their design. If the client does insist on using nonstandard forms, the designer should have his legal counsel review the contract thoroughly, comparing and contrasting it with the standard forms to identify areas of increased liability. The designer should also have his insurance counsel review the contract for insurability of the terms of the contract and how they compare with the exclusions.

Frequently, because of omissions and poor drafting, provisions in nonstandard contracts will lack clarity of purpose and intent and be grammatically incorrect. As a result, the parties will not be able to interpret the provisions, and will not be able to determine each party's rights and responsibilities, increasing the potential for unknown liability. If the provision is unintelligible, the designer should insist on a redraft, with legal counsel assistance as required, so that the contract clearly states the rights, duties and responsibilities of the various parties to the contract.[30]

3.2.5. Contract Provisions

At this point in the development of the design services agreement, the designer and the client have established the elements of the contract, and some of the rights and responsibilities of each party. They must now refine the contract to include special conditions that will further define the rights and responsibilities of the parties. These special conditions will include provisions for handling changes, extra work, and disputes; schedules; insurance; and clauses establishing or transferring risk. Other special conditions that should be examined are guarantees or warrantees, cost limitations, and clauses that assign responsibility without control.[46]

3.2.5.(a) The Basic Fee

The potential services that a designer may provide during a construction project are expanding all of the time. The public is exercising more control over the design of public projects through referendums and lobbying, and is expecting more of the designer in the form of protecting the public's interest. Designers are also participating more in the economic and financial aspects of a project for the client.[47]

In general, the basic fee that is included in a design services contract includes development of the plans and specifications only, with some construction phase services such as payment certifications, shop drawing review, on-site observations, and change order processing. The designer will usually believe that all other services are additional and require additional compensation. Unfortunately, the client may believe that all other services that he desires are included in the basic fee. This can cause

problems when the client claims that the designer is not performing the contracted services and refuses to pay. Therefore, all of the services that are included in the basic fee should be stated in the contract, as well as the services that are not included in the basic fee. The AIA Document B141 is a good example of this practice. In that document, Articles 1.1 through 1.5 clearly state the various services that are included in the basic fee from schematic design phase to completion of the project. Articles 1.6 and 1.7 list the services that are not included in the basic fee and require additional compensation if desired.[47]

3.2.5.(b) Changes and Fees for Extra Work

Minor changes are handled in general as a part of the basic services and do not require extra compensation. However, there is rarely a project that will not have one or more major changes due to changed conditions and/or owner desires. These changes can have a tremendous amount of design work. The AIA Standard Form of Agreement Between Owner and Architect, Document B141, defines changes that will require additional compensation as those "due to causes not solely within the control of the Architect."[47] The contract should anticipate these kind of changes and provide some guidance as to how the designer will be compensated. One method would be to establish a set rate for each change, such as $100 per change. Another method would be to specify that the designer would be paid at a rate 2 1/2 times the actual and reasonable salaries of the personnel involved with the change.[50]

3.2.5.(c) Schedules

It can be very difficult to determine an exact time schedule for design services, especially if the design is incorporating innovative techniques. As a result, the designer should be hesitant to agree to a rigid schedule determined by the owner. Conversely, the owner has a right to expect timely completion of the design so that he may begin construction and be able to anticipate a substantial completion date when he may be able to utilize the structure. It is, therefore, critical that the contract address the issue of time. The owner should be able to establish an estimated completion date for the design, but should also be willing to adjust the schedule if the designer experiences valid delays. If there is a need for a schedule, the designer and the owner should develop it jointly, and then the designer should strive to meet that schedule.

Though a clause dealing with time may provide for a schedule that the designer must strive to meet, the clause should not stipulate liquidated damages. It is generally accepted that the design, drawings, and specifications are never really completed. If the contract allows liquidated damages, the designer will tend to deliver the documents by the deadline regardless of condition. This will invariably lead to added construction costs and extended construction time. It is also possible that liquidated damages will not be covered by the designer's liability insurance.[25]

3.2.5.(d) Cost Limitations

The owner is typically concerned about the estimated construction costs for a project, and justifiably so. He may be on a limited budget, or have to secure financing. If a public entity, he may have the funds

appropriated. The owner may, therefore, attempt to insert a cost limitation clause into the design services agreement. A cost limitation can place liability for the cost of construction on the designer. If the cost is above that estimated by the designer, he may be barred from recovering his compensation for the design and any other services that he may have provided. This cost limitation may be expressed or implied. The expressed cost limitations are usually easy to identify, but could take the form of a "fixed limit of construction costs." The implied cost limitation could occur when the designer is made aware of the owner's budget for construction, especially if that budget is fixed as in public projects. If a cost limitation is stipulated in the contract, then the designer must adhere to the requirements. If possible the designer should insert a clause stating, "When requested to do so, the designer will furnish estimates of cost of construction, but he does not guarantee the accuracy thereof."[50] The subject of cost limitations will be further discussed in section 4.1.3.

3.2.5.(e) Warranties and Guarantees

Clauses that require the designer to warrant or guarantee his work or any one else's work should be particularly avoided. The design professional is required to exercise the normal standard of care and skill common to the profession. The courts have accepted the premise that designs will not be perfect and, in the absence of negligence, will not imply a guarantee for the design. However, if there is an expressed warranty or guarantee, the courts will interpret the wording literally and enforce the provision. Wording such as "The design professional shall prepare complete drawings and specifications for the project" may be interpreted as an

expressed warranty.[30] Another example is, "The design professional agrees and represents that his design, plans, specifications, and all drawings prepared and services rendered shall be free from defects and faults."[32] If the designer allows such a clause to be included in the design services agreement, then he has agreed to a standard of care and skill in excess of common practice.

3.2.5.(f) Responsibility Without Control

When reviewing the contract, the designer should be cautious of clauses that assign responsibility for some aspect of the project without also assigning him the control over that aspect. Some of the subjects falling under this heading are job site safety and safety programs, project costs, completion times, equipment delivery, and fabrication of systems.[32] These activities are under the control of the owner or contractor and are therefore his responsibility. The designer should make sure that he is not assuming any of the owner's or contractor's duties.[46]

3.2.5.(g) Clauses Transferring or Limiting Risk

There are two primary types of clauses for transferring risk from one party to another-the indemnity clause and the exculpatory clause. With the indemnity clause, the indemnitor agrees to protect the indemnitee against all loss or damage in and by reason of liability to another person. Indemnification is equitable in nature and is based on the legal principle that everyone is responsible for the consequences of his own wrong.[11] Though it is typical for the designer to indemnify the owner for the designer's own and sole negligence,[46] an owner may try to require the

designer to provide indemnification for his and the contractor's negligence. It is legal for the owner to be indemnified by the designer against his own negligence (*Thomas Awning & Tent Co. v. Toby's Twelfth Cafeteria*, Inc., 204 So 2d 756), but it is not looked upon with favor by the courts, and must be clear and unequivocal (*Nat Harrison Associates, Inc. v. Florida Power and Light Co*, 162 So 2d 298).[11] Many states have recently enacted legislation prohibiting such use of the indemnity clause, but the design professional should seek legal counsel if he suspects that he is being required to indemnify the owner for the owner's negligence.

In contrast to the indemnification clause, the exculpatory clause denies any and all claims of damages, regardless of liability. It also, if intended to relieve a party of liability for its own negligence, is considered valid and enforceable, but is also not looked upon with favor by the courts (*Ivey Plants Inc. v. FMC Corp.*, 282 So 2d 205). In design services agreements, the exculpatory clause is frequently used to deny the designer the right to claim against the owner. As long as the requirements of law are met, the parties are free to shift the burden of loss. However, the designer should convince the owner not to include such a clause if at all possible, since it only works sometimes, and is very self serving.[13]

One type of clause that the designer should not include in the contract is a clause limiting his liability to the owner. Such a clause would state that the designer is only liable up to the amount of their design fee or some set amount, say $50,000, in the event of a claim against the designer. This type of clause is valid if it is clear and unequivocal on the limit of liability,[11] however, it raises some ethical questions about the professional responsibility of a designer. The designer should accept full responsibility

for his actions if they are a cause of damages to another. This type of clause may be against public policy, and therefore unenforceable. As of yet there have not been many cases testing such a clause.[22]

CHAPTER IV

THE DESIGN PHASE

The design phase follows the signing of the design services contract and is an interactive process between the designer and the client. The client will describe his needs to the designer, along with what he wishes to spend on the project. The designer will then take that information and develop a schematic design for the client's review. Following approval of the schematic design, the designer may conduct preliminary studies, develop drawings or models, outline specifications, and revise costs. If the client approves these preliminary developments, then the designer will prepare detail drawings and specifications, and will usually develop the general conditions and bidding documents.[47] This chapter will discuss the decision making process and the development of the specifications and working drawings.

4.1. Developing Design Alternatives

In developing the potential design alternatives for a project, the designer should work closely with the client and follow a step-by-step procedure to insure that the final alternative has been thoroughly discussed and analyzed by the designer and the client.

4.1.1. Establishing the Assumptions and Requirements

During the initial consultation with the client, the designer should receive the client's provisional instructions concerning his needs and, more importantly, should discuss the client's involvement in the design process. Such involvement includes providing a program stating the project requirements and design objectives, establishing a budget, utilizing legal, insurance and accounting services, providing technical testing, and making design decisions and approvals.[19] The client should make the designer fully aware of the amount budgeted so that the designer can "design to cost."[9]

Following the initial consultation, the designer should immediately get confirmation of the meeting by reducing to writing what he believes the client demanded. This will be for the client's benefit as well as the benefit of the designer, insuring that there are no misunderstandings on the requirements.[32] Specifics to confirm are performance standards, maintenance and user needs, appearance and amenity requirements, and all information on the site conditions that is possessed by the client.[27] With this confirmation, the designer can begin to analyze alternatives, confident that he has the information required to make an accurate selection.

4.1.2. Deciding Between Alternatives

In deciding between alternatives, the owner expects the designer to protect him from his lack of knowledge, as well as providing a building suitable for its intended purpose, designed in light of legal restrictions, and reasonably well conceived in terms of today's technology. These

expectations virtually place an implied warranty on the design as far as the client is concerned,[50] creating additional risk for the designer. The threat of a suit should the design not perform as the client expected tends to make the designer more conservative and less creative. Therefore, the designer does not fully utilize his professional potential.[14] It becomes very comfortable and convenient to duplicate or extrapolate from known procedures and designs[9] and consequently, innovation is destroyed.

To overcome such tendencies, the designer should identify the risks that are likely to be encountered at the outset of the design process. Analyzing experiences, both good and bad, on similar projects is an effective way of identifying those risks and determining how to minimize them. In addition, the laws, practices, policies, and procedures previously used in the particular area should be reviewed to determine how they may impact the current project.[9] Once this information has been collected and reviewed, the designer should proceed with the alternative selections by utilizing a cost planning or operational research technique. This type of technique is deliberate and formal, and will more likely result in the best solution being reached and all errors in judgement being detected.[27]

Other sources of information can be as useful as previous experience for the design professional. One such source is the Architectural and Engineering Performance Information Center (AEPIC) located at the University of Maryland. Many designers and organizations have donated case studies on numerous structural failures and the resulting investigations. The information is available for use in planning new projects, teaching, modification of codes and regulations, and investigations for arbitration and

litigation proceedings. The information can be extremely valuable for studying similar cases to determine causes of failure.[14]

Another source of information is the construction contractor. It is his business to be informed and familiar with construction techniques and materials. His knowledge, if used in the design phase, could make the construction more economical. Unfortunately, the contractor is seldom selected prior to or during the design phase. Regardless of the method used, the designer must keep abreast of new developments, standards, and research in order to develop a thorough, complete design that is in accordance with the latest knowledge of the profession and design codes.[14]

There are several precautions that the designer should exercise while developing the different design alternatives. First, he should not rely solely on information supplied by the client, especially with such documents as plans and surveys. There may have been further work or alterations performed since the client obtained the documents, so they may not indicate actual conditions. If they are used without verification, the designer could be held liable for any damages attributed to their use.[39] If using site borings provided by the client, the designer should only report the data given on the borings. The designer should not in any way try to interpret the information, especially between two borings. This could leave the designer liable for any changed conditions found in the course of construction.[36]

When considering using new products or materials in a design, the designer should be convinced of their performance and merit. If necessary, he should conduct independent testing before incorporating them into the design. The designer should also be careful that the product or material, as well as the overall design itself, meets code requirements. If some portion

of the design does not meet the applicable codes, then the design will not be approved. This could also make the designer suspect for other problems in the design, causing him to have to defend his position and possibly prove to a jury that the design developed was acceptable in the profession.[10]

Finally, any and all calculations used in the design should be detailed and complete with notes and theoretical development. These should be assembled at the completion of the design and bound for future reference, and possibly as evidence should a dispute arise.[10]

Throughout the development of the design, the designer should be keeping the client advised on all aspects of the various alternatives, including the risks associated with each one.[39] The designer should give the client a realistic appraisal of exactly what he can expect with the available money and real estate. The designer should also advise the client on the unpredictable factors of the project and have him set up a contingency fund.[36] Given this information, the client can then make an educated decision as to the alternatives he wishes. As was discussed in section 3.2, if the client is inexperienced, then the designer can be considered his agent, making decisions for the client. If the client is informed, then the client can make his own decisions, and the designer will be regarded only as a consultant. The difference can determine the liability risk of the designer.

At this point, having reviewed the alternatives, the client may decide that he wants to modify the design to reduce costs, usually by reducing the design caliber or standards. The designer should not give in to such prodding without directions in writing from the client.[36] If this is not done, then the client may file suit against the designer after completion of the

project, claiming that the performance was not that for which he contracted. The designer will then have to prove that the client was aware of the reduced performance when he directed the modification. This is difficult if there is nothing in writing supporting the change. The designer should also remember that he has a basic loyalty to the public over and above his loyalty to the client. If the wishes of the client clash with the best interests of the public, then the client should be so advised.[10] The important thing to remember is that the client should make all final decisions, which should be in writing.

4.1.3. Cost Limitations

Within the construction industry, it is recognized that cost predictions, or estimates, are not scientific. However, the designer should assume that the estimate is critical to the client, and that the client does not realize the difficulty in estimating costs. The designer may be providing what he considers to be an educated guess, while the client believes that he is receiving a firm proposal that is intended to be binding on the designer. The many cases that have been decided clearly demonstrate the frequency of the misunderstandings and the difficulty of estimating the costs.[47]

The traditional method for estimating costs, particularly in the early stages of the design, is to use a rough rule of thumb based on the projected building volume or total area of floor space. These estimates can vary significantly and should not be construed as construction estimates. To obtain a refined estimate, the client should hire someone to conduct a detailed estimate, similar to a quantity surveyor. Most designers will

decline to make such an estimate. In fact, the AIA documents include only a "statement of probable construction costs" in the basic fee, but do include a "detailed estimate of construction costs" as an additional service, with additional compensation. The documents clearly state that the estimates are not "fixed limits of construction costs," since this wording would express a cost limitation on the designer. The NSPE documents allow "opinions of probable project costs."[47]

In general, any clause that states that there may be no obligation to pay based on costs of the project is considered a cost limitation. The cost limitation may be expressed and, if stipulated in the contract, the parties must adhere to its intent. The more dangerous cost limitations are those that are in some way implied. If the designer knows how much money is available, and that more is difficult to obtain, then he may be subject to a cost limitation (*Stanley Consultants v. Kalicak Construction Co.*, 383 F.Supp. 315). In addition, if the contract does not address the subject of cost, then parol evidence may be allowed establishing a cost limitation (*Stevens v. Fanning*, 207 NE 2d136).[47]

Under some conditions, the cost limitation will not be enforced. For example, the designer must be in complete control of the costs of the design. Also, if the owner makes changes, or accepts the design knowing the full cost, then the cost limitation is no longer valid. The courts will also allow a reasonable variation in the actual cost. In *Vaky v. Philips*(194 SW 601), the courts allowed a cost overrun of 10%, while in *Stevens v. Fanning* the courts ruled that a cost overrun of 27% was excessive and prevented the

designer from collecting his fees.[50] Cost limitations are best handled by including in the design services contract a clause as discussed in section 3.2.5 (d).

4.2. Specifications

Specifications are written descriptions of materials, equipment, construction systems, standards, and workmanship for a project. As such, they are more readily understood by persons not associated with the construction industry and who do not understand drawings.[33] Construction contracts also generally contain clauses stating that the specifications take precedence over the drawings. For these reasons, courts tend to look to the specifications to determine what the designer really intended to state. Unfortunately, specifications are frequently ambiguous, tend to be poorly coordinated with the drawings, and are an inappropriate type for what the designer wanted to accomplish. This section outlines the various types of specifications, considerations for writing specifications, and some precautions that should be noted.

4.2.1. Types of Specifications

Just as there are numerous ways of communicating between people, so there are many different types of specifications. In addition, many of these can be placed in several different classifications. In practice today, the specifications not only include the technical provisions, but also the legal forms of the General Conditions, Special Conditions, Bid Forms, etcetera. It

can be argued that the technical provisions are the real specifications, and that the total package should be called the project manual.[33]

4.2.1.(a) Boilerplate

The general provisions and related documents, also known as the boilerplate, are usually bound in the project manual in front of the technical specifications and outline all of the legal requirements of the project. Documents that are frequently contained in the boilerplate include:

Prebid Qualifications	General Conditions
Supplemental General Conditions	
Special Conditions	Bid Forms
List of Subcontractors	Bond Forms

Since the boilerplate provisions can be used on many different projects, they are repetitive and should be reviewed periodically to insure that they continue to be legally correct and appropriate. The designer should be careful not to include some provisions that are applicable and some that are not. All provisions not applicable to the project should be removed so as to reduce the number of ambiguities that will invariably be interpreted against the writer. If standard forms are used, such as the AIA documents, these provisions should be the latest edition available.[20]

4.2.1.(b) Technical Specifications

The technical specifications are used to complement the working drawings by describing quality, workmanship, installation procedures, and inspection and testing procedures, none of which can be accurately portrayed on the drawings. If complete, original sets of specifications

were required for each project, the specifier would have an insurmountable task with each new design. As it is, many specifications can be used for several similar projects, and various other specifications can be obtained from sources such as:[20]

Material Standards- American Society for Testing and Materials (ASTM), American National Standards Institute (ANSI), Federal Specifications

Guide Specifications-MASTERSPEC, Construction Specifications Institute (CSI) Manual of Practice and Specifications Series

Journals/Periodicals

Building Codes/Ordinances

Materials Investigations-Underwriters Laboratories, Inc.

Association Standards-manufacturing, technical (American Concrete Institute)

Manufacturer's Catalog Files-Sweets Architectural File

General Reference-American Arbitration Association, Concrete Reinforcing Steel Institute, American Institute of Steel Construction, Inc., American Iron and Steel Institute

These specifications can be found in various forms, but most will be classified in either of two ways: descriptive or performance; or open or closed.

4.2.1.(c) Descriptive Specifications

The descriptive specification describes in detail the materials,

workmanship, installation or erection of a product in cookbook fashion. It is especially used when the designer wants more than the minimum performance,[2] and is usually based on a wealth of information and experience on the part of the specifier. When the descriptive specification is used, it is easier to inspect, approve, and test the materials, methods, and results since the requirements are specified in detail. It can be a disadvantage to the owner in that the designer will not spend an inordinate amount of time researching newer materials and methods, but rather, will specify materials and methods with which he is familiar. It is favorable to designers because it places control of materials and methods in their hands. Contractors favor it because it places the responsibility for selection of materials and methods, and the end results, on the designer.[38]

4.2.1.(d) Performance Specifications

With the performance specification, the materials and methods are left completely up to the contractor to obtain the specified results. The end results are specified by formulating criteria for its accomplishment, such as physical properties for materials or operating characteristics for equipment.[38] The provision will state a general requirement, i.e., provide fire safety; will list the criterion for meeting that requirement, i.e., maximum flame spread 25; and will outline the test for evaluating the criterion, i.e., ASTM E84.[38] The contractor can then use any method or material, as long as it passes evaluation. It is used frequently when a contractor is required to match or obtain results consistent with an existing situation. With the advent of systems building and its numerous components, the performance specification has gained more widespread use.

Though this type of specification removes much of the responsibility from the designer, it also removes much of the control of the materials and methods. The designer then has to accept or reject the work after it is an accomplished fact, which could cause serious delays. The contractor must determine how to achieve the work with someone else approving it after it is in place.[20]

The performance specification encourages the contractor to utilize more efficient practices and improved materials, resulting in a lower cost to the owner. It also encourages competition between manufacturers.

4.2.1.(e) Open Specifications

The open specification is used primarily in public sector work where references to brand names or proprietary marks are forbidden. In their simplest form, open specifications will be a reference specification. If this is not the case, then it will have to be a descriptive or performance specification that makes no mention of a brand name and does not require a particular product to meet all of the criteria. This type of specification allows the greatest amount of competition and complete impartiality between products. Using reference specifications will enhance approval since most manufacturers will provide certifications of compliance for most standards. A major drawback of this type of specification is that it is usually inadequate for specifying man-made products of chemistry, or mechanical and electrical equipment. The man-made products are frequently unique, and it requires a voluminous descriptive or performance specification to cover mechanical and electrical equipment.[38]

4.2.1.(f) Closed Specifications

The counterpart of the open specification is the closed specification. There are several types of specification that fall into this category depending on the degree of restriction. The most restrictive is the proprietary specification, in which the specifier states outright one brand name, listing the actual make, model, catalog number, and possibly a brief description, of the product in question. With this type of specification, the bidder has no choice in the product selection, and the responsibility for adequacy lies entirely with the designer. The disadvantages of this specification include exclusion of competition, possible favoritism on the part of the specifier, and a potential for decreased value for the owner. In addition, the contractor required to install the material or equipment may have no experience with that particular brand. This type of specification is advantageous if it is critical for the designer to have complete control of physical characteristics such as room sizes, headroom, vital dimensions, or clearances. The designer can also determine the foundation requirements in advance.[38] The proprietary specification is especially useful for remodeling or matching existing facilities.[20]

Closed specifications that are less restrictive are bidder's choice, or restricted specifications, and bidder's list of substitutions, or option specifications. With the former type, two or more brand names are listed in the verbage, giving the bidder a choice. The designer, in utilizing this type of specification, must insure that the individual brand names are truly "equal."[38] In the latter type of specification, the bidder submits a list of proposed substitutions of a product with his bid, along with the net

difference in cost if accepted. Though this type of specification will encourage competition, the substitutions can be numerous. Several substitutions from this process will also preclude an original design.[38]

4.2.1.(g) "Or Equal" Clauses

A type of clause that is frequently used, and even more frequently abused, to allow competition among bids without naming every acceptable brand or using a descriptive or performance specification, is the "or equal" clause. To use this clause, the designer will name one, two, or more brand names of a product, then insert the "or equal" clause at the end. The clause was originally used to create an open specification and to establish a certain standard, but the disadvantages are numerous. First, the bidder, at the time his bid is submitted, does not know if his substitution will be approved. If it is not, then he will be forced to increase his costs. Next, the clause increases the amount of office work required of the designer in reviewing and evaluating substitutions. If the substitution is submitted at the last moment, there will be a tendency for the designer to give a hasty approval in order to not cause a delay. If the construction is phased, then there is the possibility of several different types of equipment being installed, causing maintenance problems in the future. Finally, the product alone may be "equal", but when used as a component in a system, may not perform equally.[38] For these reasons, use of the "or equal" clause should be avoided.

4.2.1.(h) Product Approval Standards

A variation of the proprietary and option specifications, which also

eliminates the need of an "or equal" clause, is the product approval standard. On the surface, this type of specification appears to be an option specification, since it names specific products or standards and allows for substitutions. However, this is where the similarity ends. If the product approval standard is used, the bidder may apply for approval of an alternate *during the bidding period.* If the alternate is approved, then it, along with all other approved alternates, is listed in the addenda for all to bid upon if so desired. This type of specification encourages competition and use of new or little known products while keeping control of the selection with the designer. In addition, the risk for the bidder is reduced, since he knows beforehand if his alternate is suitable, resulting in closer bids. Though this method enhances the flexibility of the design, the designer should be sure to set a deadline for submitting alternates far enough in advance of the bid closing date to enable him to adequately evaluate the submittals.[38]

4.2.1.(i) Reference Specifications

As the name suggests, a reference specification, or a standard that has been established, is referred to in the body of the technical specifications. The standard can be a material, test, method, or installation procedure. The referenced standard then becomes part of the specifications to the degree that the descriptive or performance language allows. Though the reference specification is a tremendous time saving tool, the designer must use it with caution since it frequently covers several types or grades of an item. The specifications are usually developed by committees representing materials manufacturers, government agencies, testing agencies, or general interest groups, and can be compromises that only set

the minimum standards. For these reasons, the designer must be very familiar with the content of each reference specification that he intends to use, and should retain copies of the specifications in his files. Federal Specifications, master specifications, and manufacturer's specifications can all be considered reference specifications.[38]

There are many industry standards manuals that have been prepared as a convenience to users to encourage and facilitate the use of their products. These same manuals are frequently referenced in building codes and specifications. The designer should be cautious when using such manuals, either in codes or as reference specifications. In recent years industry has been severely affected by strict liability. As a result, the products industry has begun to place disclaimers and exculpatory language into the manuals that they prepare. The manuals may require the designer to approve or inspect installation methods, or otherwise be contrary to the terms and conditions of the design services contract. The designer should insure that he has the latest edition of the manual and review it carefully.[23]

4.2.2. Writing Specifications

Specifications serve two main purposes: 1) they transmit design decisions to the contractor,[38] and 2), they assign risks in an equitable way so that those assigned can bear the risks.[9] To accomplish these purposes, the specifications must be clear, complete, concise, and correct. The design professional should begin writing the specifications at the same time that the working drawings are begun. Words expressing the exact intention should be used over and over. These same words should be defined as used in

the contract somewhere in the supplementary conditions. An example of this is for earthwork. The unit of quantity for earthwork may be the cubic yard, but is the cubic yard in situ, in transit, or in place? There can be large differences in how they are measured, so they should be stipulated in the specifications.[50]

Another important rule is to avoid using words or phrases that can be ambiguous. In *Wood & Company v. Alvord & Swift* (258 N.Y. 611), a dispute arose over the interpretation of the clause, "all concealed heating risers and radiator connections shall be covered." The contractor interpreted the phrase as meaning all concealed risers and concealed connections. Therefore, he did not cover the many connections that were visible. The designer interpreted the phrase to mean that the visible connections were to be covered. Since the designer wrote the specification, the court interpreted it against the writer. The owner had to pay extra for the radiator connections to be covered. This could have been avoided by the insertion of one word "all" before radiator connections.[50]

Ambiguities can also be created by repetition or duplication of information in the plans or specifications. It is rare that one can exactly duplicate or repeat information within the documents. Most often, the writer is only trying to clarify a previous bit of information and, by using different wording, creates an ambiguity. If the bit of information needs to be clarified, then it should be extracted and rewritten, then used only once.[38]

It is important to avoid stilted language and to be short and precise when writing a specification. Compound sentences that ramble through

several subjects should not be used, but rather, the specification should contain the fewest words possible to provide a complete description and make sense.[2] Streamlining the specification improves the length, but as previously discussed, it is just as important to include all of the required wording to express the full intent. The directions given to the contractor should be definite and mandatory, using the word "shall" rather than "must" or "is to." It is fairly easy to enforce such a precise statement, while vague statements may not be enforceable, and the contractor will charge for them anyway.[38]

Some designers will include a "grandfather clause" somewhere in the specifications. The intent of such a clause is to address all contingencies, but does not usually include the required specificity to meet problems when they arise.[9] It may in fact suggest that the designer is incompetent. An example of this type of clause is, "the contractor shall furnish and include everything necessary for the full and complete construction of the building whether shown or specified or not shown or described."[38] It would depend on the circumstances of the project as to whether or not this clause would be effective, but the designer can be assured that the contractor will include money for such contingencies in his bid.

A final suggestion for the writing of specifications is the use of the residuary legatee, a term borrowed from the legal profession. The residuary legatee is used when calling out the locations for various materials under one heading. The materials present in the smallest quantities or locations are specified, followed by the greatest quantity of material being specified in "all other locations." This will insure that all locations requiring that type of material are identified.[38]

4.2.3. Precautions in the Use of Specifications

When developing specifications for a project, the designer is faced with the problem of whether to use performance or descriptive specifications. The main factors in making such a decision include the amount of risk and the amount of control that the designer is willing to retain. As discussed in sections 4.2.1.(d) and (e), the descriptive specification places the risk on the designer, but also allows him to retain control of the methods and materials. The performance specification allows the contractor control of the methods and materials, and could mean that the material will be in place before the designer can approve or reject. However, the risk is placed on the contractor. There is no way for the designer to retain control of the methods and materials, while at the same time placing the risk on the contractor. This was pointed out in a landmark decision that is frequently cited in decisions today, *MacKnight Flintic Stone Co. v. The Mayor* (160 N.Y. 72; 54 NE 661). In this case, the contractor was provided a descriptive specification for waterproofing a boiler room. The contractor followed the specification exactly, but the room still leaked. Another clause in the specifications stated that the contractor was required to turn over the entire building "in perfect order and guaranteed absolutely water and damp proof for five years." The city refused to pay the contractor and the contractor filed suit. The appellate court reversed the lower court, stating that there was a defect in the specification prepared by the city. The contractor did not guarantee the sufficiency of the plans and specifications. If the contractor is required to guarantee the results, then he must have the

latitude to use the methods and materials that he wants.[16] The designer should therefore determine the degree of control that he wishes to exercise over the project, then be willing to accept the accompanying risks.

Section 4.2.1 (h) listed several reasons for avoiding the use of the "or equal" clause, including the difficulty in determining if the product in question really is "equal" to the one specified. Several court cases have discussed this problem further and have established guidelines applicable in some situations. In *W.G. Cornell Co. of Washington, D.C. v. The United States* (376 F. 2d 299), the contract required rigid insulation to protect air ducts. The contractor provided blanket insulation under the specification's "or other equally suitable material" clause, which was rejected by the contracting officer. The court ruled in favor of the contractor since the same field division had allowed an identical substitution in other contracts. The court went on to state that the discretion involved in determining an equal substitution must be "exercised reasonably and fairly."[16]

In the case of Brunswick Inc. v. The U.S. (case B-169662), the court stated that the salient features used as a basis of rejection must be listed in the specification. In this case, the contractor provided a pinsetter under the "or equal" clause that returned balls two seconds slower than the one specified. It also did not allow practice bowling without pins. The court allowed the substitution after it was discovered that these features were not listed in the specification.[2] Though it is usually the owner that pays for such decisions, the designer should remember that if negligence is involved, the owner can claim against the designer. Therefore, if the "or equal" clause must be used, it is imperative that all required features that could be a basis for determination of equality be listed in the specification.

4.3. Working Drawings

The working drawings, sometimes referred to as plans, are a form of writing, a kind of "picture language" that give the contractor necessary information that is more readily and accurately transmitted graphically. Information such as shapes, sizes, detailed dimensions, and relationships between parts that cannot easily be transmitted through words is included in the drawings.[7] Together with the specifications, the working drawings communicate the abstract ideas of the owner to other people as interpreted by the designer. This section will explore the various types of drawings and outline procedures for insuring that the necessary information is illustrated clearly and accurately.

4.3.1. Types of Working Drawings

There are many facets of a project that must be illustrated in the drawings. One type of drawing is not able to do this. For example, the heating ductwork cannot be shown accurately on an elevation plan, nor can the site layout be shown on a structural drawing. As a result, there are several different types of drawings that should be used to complete a set of plans.

4.3.1.(a) Detail Drawings

Detail drawings illustrate the complete requirements needed to build a single item. They will show the complete and exact description of shape, dimension, and construction of the item in question. This type of drawing, if devoted exclusively to the detail of one item, is usually cleaner, less cluttered and easier to work from and read. It is the simplest form of working drawing and gives a more accurate description than any other drawing type.[42]

4.3.1.(b) Assembly Drawing

The assembly drawing presents the assembled configuration of two or more parts. It is used mainly for mechanical work, and presents a clearer picture since it contains no hidden lines. It is also useful for verifying the accuracy of detail drawings.[42]

4.3.1.(c) Installation Drawing

The installation drawing shows how and where an item is attached to the overall structure. It provides dimensions, orientation, mounting of connections, and clearances, and how the item is mounted in relation to other items. This type of drawing permits faster, easier, and more accurate installation.[42]

4.3.1.(d) Diagram

The diagram uses symbols and lines to show characteristics, connections, and relationships of systems. A schematic diagram shows

electrical and mechanical circuits; a wiring diagram shows electrical connections; and a piping diagram shows the interconnection of the system components and the sequential flows. The diagram is essentially a short hand method of showing how something works without regard to physical characteristics.[42]

4.3.1.(e) Construction Drawings

The construction drawings are a set of drawings showing the design of buildings and structures, including equipment and utilities. They will include erection drawings showing procedures and sequences for erection; plan views showing the horizontal orientation of floors, the roof and foundation; plot plans showing the relationship of the facility to boundary lines, streets, walks and utilities; and vicinity plans showing the site in relation to the surrounding area.[42]

4.3.1.(f) Structural Drawings

The structural drawings illustrate the framework and supporting members of a structure. They will detail the reinforcement and assembly procedures for the erection of the structure.[42] Anchoring to foundations will also frequently be shown on the structural drawings.

4.3.1.(g) Maps and Topographical Maps

Maps are representations of part or all of the earth's surface. The topographical map is a graphical representation of the natural and artificial features of the earth's surface. Other special drawings falling into this category are surveys, city plats, and contour maps.[42]

4.3.1.(h) Schedules

A schedule will list the various finishes, doors, windows, hardware, etcetera, that will be used in the construction. Each line item on the schedule will usually be accompanied by a symbol that is referred to at the location in the working drawings that that item will be used.

4.3.2. Common Features of Working Drawings

Though details of drawings will vary from office to office, there are some features common to all types of drawings. They will have preprinted borders, a title block usually located in the lower right corner, and a block for recording the various revisions that drawings undergo. The field of drawing is inside the border, excluding the title and revision blocks, and consists of pictorial, dimensional and tabulated data. Other data commonly found in the field of the drawing are lists of materials with find numbers. Notes will be located close to the respective item or separately on the side of the drawing with a symbol correlating it with the item if needed. The revision block will contain space for a revision symbol, description of the revision, the date of revision, and the signature of the person approving the revision. The title block will contain space for the description of the drawing, the drawing number, the project name and number, the date drawn and approved, the initials of the drafter and checker, and signature of the designer who approved the drawing. The scale may also be noted in the title block. Since most drawings do have these common elements, it is easier to locate the information that is needed quickly.[42]

4.3.3. Developing Working Drawings

The design professional is responsible for transmitting the design criteria to the contractor as accurately as possible. If the working drawings are not themselves accurate, then this can not be accomplished and claims will arise for extra or faulty work and delays. The most frequent shortcomings leading to such claims are lack of communications between the designer, draftsman, and specification writer; lack of actual field experience by the draftsman; and superficial review by design personnel.[34] If it can be shown that the design professional did not exercise the normal standard of care and skill in overcoming these shortcomings, then he will be held liable.

The first thing that a designer can do to improve drawing quality is to standardize office procedures and drawings. This would include using one size drawing only, limiting the amount of information on each page, and limiting the number of scales on each page.[27] Though it may take more drawings to depict the entire project, the cost of the extra pages will be saved several times over through the decrease in confusion caused by crowded drawings.

For intraoffice use, the designer should develop a drafting manual that will standardize and control the techniques used by the different draftsmen. The manual would outline the policies, procedures, and standards that are required for the uniform and efficient production of working drawings. Such a manual would set minimum quality levels for drawings, establish accepted and uniform practices in the preparation, use, and maintenance of drawings,

and serve as a training aid for new personnel. The manual should address such topics as identification of data, drawing types, formats, drafting practices, dimensions and tolerances, lettering, change procedures, abbreviations, and symbols. Each draftsman should clearly understand that the procedures are strictly enforced, and that they must obtain permission to deviate from the provisions of the manual.[42]

Finally, the designer should define channels of communication between all people involved in the design to insure proper coordination between the drawings, and to insure that all changes are incorporated and errors are corrected. This is especially important if consultants are used. The full set of plans should be supplied to the consultants, and this set should be returned intact. The drawings should also be arranged in a logical sequence, with drawings of each discipline together.[34]

4.3.4. Reviewing Working Drawings

Periodically during the production of the drawings, and again at the completion of the entire package, the drawings should be carefully reviewed for accuracy and coordination with the specifications. There are a variety of ways in which this can be accomplished. The office may have a staff designated as checkers, who do nothing but review designs. A team, similar to a value engineering team, may be organized to review the design, or a principal of the firm may conduct the review, but the designer himself should not conduct the review. It would be difficult for him to identify errors or omissions.

In order to be thorough, persons conducting the review should utilize a checklist. The checklist and the resulting review should include the following points:[42]

"1. Acceptability of design approach.
2. Conformance to designer's layout drawing.
3. Practicality of manufacturing requirements.
4. Correct material callout.
5. Acceptability and accuracy of parts and materials identification.
6. Strength and rigidity of structural design.
7. Economy of design and parts selection.
8. Clearance and tolerance acceptability.
9. Specification of Quality Assurance and testing requirements.
10. Accuracy and completeness of line weights, arrowheads, spelling, scales, abbreviations and titles.
11. Drawing callout.
12. Data in title block.
13. Parts list and callout agreement.
14. Adequacy of notes.
15. Approval signatures."

The designer should not interpret this review as a review of his competence. It is intended only to identify potential problem areas, errors, and omissions before they result in a claim or liability problem.

4.4. Design Aids

In addition to the various resources that the designer uses within his office, he occasionally will require other resources to obtain the expertise that he lacks, or to relieve the excessive workload that is inherent in most design firms. Two common design aids that will accomplish these goals are the computer and consultants.

4.4.1. Computer Aided Design

The design profession has greatly benefitted from the microcomputer boom. Computers are no longer a closed society of "experts" with their mumbo-jumbo that few other people can understand. Computers now have a user friendly atmosphere with a "do-it-yourself" environment.[28] Within the design profession, computers have relieved the designer of the many time consuming routine tasks while allowing the designer to maintain control over the results and broaden his "feel" of the various structures.[41] Unfortunately, with the glut of "engineering" software, for a small cost anyone with a rudimentary knowledge of engineering can become an "expert." These software packages can be anywhere from excellent to atrocious, with the atrocious packages being as easy, if not easier, to obtain. The real danger of these packages is that the young inexperienced engineer may not know the difference, and powerful software will become life threatening.[28]

The use of computer aided design raises both ethical and legal questions. Is it ethical to use a program developed by an unknown party to perform engineering design which will be approved by a design professional? Does this fall under the category of approving work that is not under the designer's direct control or supervision? More importantly, who is responsible if the software is defective and results in a failure, possibly causing deaths? Is computer aided design part of the normal standard of care and skill? These as well as other questions should be considered before a designer uses a software package for a design.

The first step in answering some of these questions is to examine the writer of various software packages. Most of the bread-and-butter

packages are canned programs supplied by software firms who will back their product and provide excellent support. These programs may be written by designers who have decided that they prefer programming, and are removed from day-to-day practice and recent developments in the design profession. The writers may also be professional programmers reducing collections of equations to algorithms. They may have little understanding of the physics of design. Other programs may be written by designers who are competent and equally well versed in design and programming, but these will be few.[43] Most likely the writer will not be truly experienced and up-to-date in the design profession. Regardless, society and the design profession tend to believe that there is a certain mystique associated with computers that does not allow for errors. Computers are dealt with as a "black box" wherein data is input and answers come out.[31] The designer must remember that, in fact, computers give results, not answers. The programmer has created a package that accepts data in a predefined format, processes the data in a structured fashion, and then presents the results in a particular format for interpretation. All responsibility for the accuracy and correctness of the answers lies wholly with the designer.[41]

Before utilizing a software package for design, the designer should assume that he and his firm are professionally liable for the integrity and credibility of the computer aided design. He must be assured that a reasonable, workable answer is obtained. He must insure that the problem was correctly stated, and that communications between the various parties involved with the design were adequate.[41] The computer program may be excellent, but if the people using it are not familiar with the inner workings

and the requirements for the input of data, then they will not be able to pick out errors that will result in an inadequate design. Traditional analytical methods will give "hands on" knowledge of the structure and confidence in the design.[31] There is no substitute for engineering knowledge, practical experience, and good common sense.[41]

Typical problems that can be encountered in the use of computers for design come from two primary sources--the program itself or the use of the program. Problems under the former category are the coding of incorrect equations for the intended application, or errors in the correct equations like dividing by 3 instead of 2. In the latter category, the program may be entered improperly, or the user may not detect typographical errors in the input data. Because of these broad possibilities, the likelihood of errors is high.[43]

The danger of incorrect input, or incorrectly using the program, is as great as any other design error.[31] Therefore, the designer must insure reliability by developing methods for validating and certifying the program and its output. The first step in validating software is to examine the documentation in order to become familiar with how the program works. The documentation, usually in the form of a user manual, should be clear and should describe the theory, assumptions, equations, and variables used. The manual should also explain exactly what type of input data is required, and in what format it should be entered. Frequently the manual will contain a sample problem to be used in validating and checking the program. This problem should be used with caution, since it only proves that the designer had the same codes as the programmer. Such problems will also be intended to show how clever the program is, and do not show that the results

obtained are correct. Therefore, the program should be further checked using problems with known results. The designer can also input wrong data and observe what the program does. If the computations have gone wild, then it may not be possible to trust other output.[43] Even if the program passes these few tests, the designer must remember that just because the program has been validated, it does not imply that the results are guaranteed to be correct. Use of validated programs does not relieve the designer of the responsibility of providing a safe design.[41]

4.4.2. Consultants

It is a recognized fact that designers cannot have expertise in all areas of design. Instead, they commonly utilize the services of design consultants with the expertise in the areas in which they themselves are lacking. These consultants are subcontractors to the prime designer and have no privity with the owner. With such a relationship, the prime designer is ultimately liable to the owner for the performance, or lack thereof, of the consultants. It is therefore imperative that the contract between the prime designer and the consultants establish the rights and duties of both parties.

First, the subcontract must comply with the provisions of the prime contract in the respective areas of expertise. In the subcontract, the prime designer is assuming a position comparable to the owner, while the consultant is assuming a position comparable to the prime designer.

Particular provisions to include in the subcontract are insurance requirements. The prime designer should insist that the consultant carry errors and omissions insurance in an appropriate amount. The consultant

should also be required to carry "important papers" insurance to guard against loss or damage of the plans and specifications while they are in the possession of the consultant. An indemnification clause should be included protecting the prime designer against damages as a result of the negligence of the consultant. Finally, the designer should include a clause in the design services contract with the owner combining arbitration proceedings; the owner against the prime designer and consultants; and the consultants against the prime designer and owner.[50]

4.5. Documentation

An important activity that should be continuous throughout the design process and all other phases of a project is documentation. The designer should write remembering that it may be used for or against him in a suit, and a judge and jury may be reading the documentation. They will be looking for items that were produced at the time of, and simultaneously with, the occurrence in question,[4] and that will be admissible as tangible evidence of the care and skill that was exercised by the designer. This type of documentation is admissible as "what was said and done,"[8] and could include purchase orders, payments, memos to file, and business files.[13]

The business files maintained by the designer should contain everything associated with each project. Items including specifications, drawings, and calculations should be bound and stored in an accessible location. A cross reference index between the documents and change orders should be developed so that reasons for changes can be justified in the future. Finally, important documents should be microfilmed in case of disaster.[42]

There is no definite rule of thumb in which to follow concerning how long data should be retained before purging files. In the past, an appropriate time would have been equivalent to the statute of limitations, normally a definite period. However, with the development of the discovery rule wherein the statute of limitations does not begin until the defect should have been discovered by a reasonable person, the period of time during which a suit could be filed has been extended almost indefinitely. Therefore, at the minimum, the designer should retain files for as long as the law requires, and otherwise, until the files have "no significant value."[42] This will require the designer to make a subjective decision based on the likelihood of a defect being discovered in a project.

CHAPTER V

THE CONSTRUCTION PHASE

Once the design has been completed, the design professional will usually be retained by the client to perform services during the construction of the project. Services normally provided would include preparation of the bidding and construction documents, review of shop drawings, on-site observations, certifications, and change order processing. The designer will also conduct the final inspection with the owner to establish substantial completion. These services are included in the basic fee. Additional services, such as more detailed inspection or completion of "as-built" drawings, can be contracted for with additional compensation. In the construction phase, it is critically important for the designer to determine exactly what services the client wants performed and if those services are included in the basic fee. The services should then be written into the agreement and performed accordingly.[47]

5.1. Designer-Owner Relationship

In contrast to the type of relationship normally found in contracts, that of the arm's length transaction wherein the parties' primary responsibility is to protect themselves, the designer, in performing his professional duties, is considered to be an agent of the owner. As such, he has a fiduciary relationship, one of trust and loyalty.[47] The designer will have duties and authority that should be clearly outlined in the designer-owner contract. He may not represent suppliers or contractors without the

owner's consent. A breach in this respect may bar the designer's right to compensation, as stated in *Audubon v. Andrews* (187 Fed. 254).[50] Because of the possible misuses of the agency relationship, the owner and the designer should be very knowledgeable of the agent's role, as well as such issues as agency by estoppel, ratification, and apparent authority. In addition, the channels of communication between the owner and the designer should be clearly defined.[10]

Generally, the authority of the designer as an agent of the owner is restricted to determining whether the work is done in accordance with the plans and specifications. This usually will include being an impartial interpreter of the contract documents and judge of performance, making periodic visits to the jobsite to safeguard the owner against defects and deficiencies, condemning work that does not conform to the contract documents, and making certifications for payments to the contractor. Unless specifically stated in the design services contract, the authority of the designer does not include approving material departures from the contract documents. He also must not fail to properly instruct the contractor when required. In some contracts such as the AIA documents, the designer may also be designated as an arbitrator between the owner and the contractor. If so, then he must act impartially and in "good faith."[50] If the designer is asked to relay information from the owner to the contractor, he should do so cautiously since, if not carefully worded, the message could be interpreted as direction and would create a liability problem for the designer.[48]

5.2. Shop Drawing and Submittal Review

Shop drawing reviews have been the subject of an increasing number of claims against designers. There are several factors that will affect claims on these reviews such as: how well the function and purpose of the submittal is understood; the relationship of the review to the design and contract documents; and the willingness to insist that all parties adhere to the procedures for handling the reviews. Professional liability problems are directly related to the care and skill with which the designer adheres to the contract documents and whether or not adequate administrative procedures are followed.[45]

Within the design profession, there is tremendous pressure to cut time and costs on each project. There is more reliance on CAD, which replaces meticulous checking. Design work is shifted to the contractors, and review of the resulting shop drawings is assigned to the least experienced personnel. Some people feel that the designer's role in approval should be eliminated altogether. However, this would be at the expense of public safety and owner dissatisfaction.

Many practices that enable the designer to be more competitive tend to compromise the designer's thoroughness and attention to detail, thus resulting in increased liability. To limit this liability, rather than exercising greater care and skill, designers tend to use exculpatory language in their stamps such as "not rejected," "accepted," "furnish as noted," or "no exception taken." These phrases do not limit the designer's liability, since return to the contractor allows the work to continue and implies approval. In fact, language of this type may even increase liability. It may indicate

that the review was not as thorough as it should have been, so juries may react with suspicion.[40] Instead of using exculpatory language in hopes of placing the responsibility on someone else, designers should adopt stringent procedures for reviews and define the purpose of shop drawing reviews in contracts.

If the designer wishes to limit his responsibility, he should do so in the contract by clarifying all ambiguities regarding reviews and stating that the review is for determination of conformance with the contract documents and design concept. He should then insist that all office and field personnel read and follow the contract provisions. Before any shop drawings are submitted, the designer should hold a preaward conference and specifically point out the contract provisions relating to shop drawing submittals to the contractor, and insist that the contractor adhere to those provisions.[45]

Once the construction has begun, the designer must never accept a submittal for review until after the contractor has reviewed and approved it. Then he should accept the submittal only from the contractor, not a subcontractor or supplier. As each submittal is received, it should be entered into a log with dates of receipt and return maintained. The log should also document whether the submittals were approved or not. If not, the reasons for rejection should be stated.[45] The submittals should be reviewed thoroughly and carefully; if satisfactory, approval should be given forthrightly. The stamp used for approval should reflect the wording contained in the contract regarding shop drawing review. Finally, the contractor should be required to submit, in writing, any deviations from the contract requirements on shop drawings.[40]

There have been several cases that illustrate some of the advantages of the above guidelines. In *Jaeger v. Henningson, Durham & Richardson, Inc.* (714 F. 2d 773), a designer was found liable for the injuries of two workmen when a landing pan that they were working on collapsed. The designer had approved a shop drawing providing 14 gauge steel, even though the contract required 10 gauge steel. In this case, the contractor did not submit the deviation and the designer did not conduct a thorough review, though his contract required it.[40]

In *Waggoner v. W&W Steel Co.* (657 P. 2d 147), the contractor claimed that the designer was liable for the construction procedures and safety because he had approved the corresponding shop drawing. The judge held that the designer's approval does not supersede the contractor's responsibility for proper construction procedures and jobsite safety.[18] This finding very nearly contradicts the previous example, the difference probably being in the contract requirements for reviews.

Another case dealing with deviations is *Creswell Iron Works v. Camden Housing Authority* (449 F. 2d 557). In this case, the contractor was required in his contract to submit any deviations in writing, which he failed to do. The designer approved a submittal for steps which subsequently collapsed. The court held the contractor in breach of his contract even though the designer approved the submittal. It must be noted that the designer could also have been liable.[40] No designer should depend on the courts finding the contractor only liable in a case such as this.

5.3. On-site Observations

In the standard forms, on-site observation is referred to as "administration of the construction contract." These forms emphasize that this does not mean continuous on-site investigations, which the owner can obtain as an additional service or by hiring a project representative. Originally, the on-site observations were called supervision. However, this wording led to continuous problems since owners generally believed that supervision meant that the designer would superintend the project. The wording was then changed to "general and periodic supervision," which the courts tended to interpret as not meaning continuous personal superintendence. In *Hubert v. Aitken* (5 N.Y.S. 839, affirmed 25 N.E. 954), the court stated:

> "An architect is no more a mere overseer or foreman or watchman than he is a guarantor of a flawless building, and the only question that can arise in a case where general performance of duty is shown is whether, considering all the circumstances and peculiar facts involved, he has or has not been guilty of negligence. This is a question of fact, and not of law."

The court went on to state that the designer "is bound only to exercise reasonable care, and to use reasonable powers of observation and detection, in the supervision of the structure."[50]

However, the facts of the case can determine just exactly how much observation is required to meet the standard of care and skill. In *Burke v. Ireland* (166 N.Y. 305, 59 N.E. 914), the designer was determined to be liable for the collapse of a column supported by a foundation placed on backfill.

The court stated, "No one could reasonably anticipate or guard against the unfortunate result, except the experts employed to plan and erect the building."[50] In this case, the placing of a foundation was considered to be a critical activity. The court felt that the designer was obliged to provide extensive observation in order to meet the standard of care and skill.

The determination of liability is based on misfeasance versus nonfeasance. Misfeasance is the improper doing of an act, while nonfeasance is the omission of an act. Producing faulty plans and specifications is classed as negligence, or misfeasance. Negligent supervision can be classed as nonfeasance under the right circumstances. If a designer discovers faulty materials and does nothing about it, then he would be guilty of misfeasance. If the designer did not discover the faulty material, it may be nonfeasance. As determined in *Olsen v. Chase Manhattar.* (9 N.Y. 2d 829, 175 N.E. 2d 350), if the designer is guilty of misfeasance, and there is an injury, then he will be liable. If the injury is the result of nonfeasance, the designer may not be liable.[50] Note that the designer *may* not be liable if guilty of nonfeasance. Some courts may determine otherwise, depending on the facts of the case.

Another area of concern for the designer is the observation of temporary construction, for in this area the courts have not been uniform. In two particular cases, the courts determined that the designer was not liable for the inspection of temporary construction. In *C.W. Regan, Inc. v. Parsons, Brinckerhoff, Quade & Douglas* (411 F. 2d 1379), the designer approved structurally a temporary bulkhead for underwater construction of a tunnel. The bulkhead subsequently leaked, damaging several pieces of equipment of another contractor. The courts found that the designer had only the

obligation to inspect, supervise, and reject the permanent construction, not the temporary construction.[16]

In the second case, *Ramos v. Shumavon* (21 A.D. 2d 4), the designer was not liable for the collapse of some formwork. However, in *Miller v. Dewitt* (37 Ill. 2d 273), the designers were found to be negligent when the shoring being used to erect a gymnasium roof collapsed. The courts held that "the shoring operation was of such importance that the jury could find from the evidence that the [designers] were guilty of negligence in failing to inspect and watch over the shoring operation."[35]

Who is responsible for jobsite safety and work procedures? This pretty much depends on the terms of the contract. In general, the designer has no duty or right to interfere with the activities of the contractor. The contractor is totally responsible for the work methods and the safety of his employees. However, in one case, *Geel v. Bennett* (237 So. 2d 311), the designer's contract called for assuring that the work was progressing in strict accordance with the plans and specifications and the requirements of funding and regulatory agencies. He was also required to maintain direct supervision over the contractor in the prosecution of his work. A mason fell while working on the second floor, which had no safety railings. One of the regulatory agencies, the Florida Industrial Commission, required the missing safety railings. Because of the contract requirements, the designer was found liable for the injury.[16]

Though the courts are not always uniform in their findings, there are some factors that can be analyzed to determine if the observations were adequate. First, how large is the project? Larger projects, of course, will require more observations. Was the designer present for crucial steps such

as concrete pours or covering work? What type of contract is being used? If the construction contract is a cost type, then it will require more monitoring. Are experimental designs or unusual materials being used? If so, then the designer should observe more closely to insure proper usages. Does the owner have the technical staff to accomplish the observations in-house? Finally, what is the contractor's record of performance in the past? The answers to these questions can aid the designer in determining how much observation is required.[47]

There are several other guidelines that can be followed when making on-site observations. Most importantly, any reference to designer supervision in both the design services contract and the construction contract should be deleted. Next, be careful of what is said while visiting the jobsite. One designer, while examining an unshored trench, commented that the trench appeared solid and did not seem to need shoring. The trench subsequently collapsed, killing a worker, and the designer was found liable.[26] Hence, it is best to call unsafe conditions to the attention of the owner and the contractor. The designer should not make suggestions on how to correct the deficiencies.[36] Finally, schedule a trip to the jobsite during each major phase of construction, then keep good records of the visits. Such records could help in determining if rejected work is due to the specifications or workmanship.[10]

5.4. Certifications

The certifications that are normally included in the basic fee include certificates of payment for the contractor and the certificate of substantial

completion. However, the designer may be asked on occasion to provide certificates to government agencies, sureties, or loan institutions. These certificates will usually be used to ascertain the amount of completion or the performance of the contractor. If such certifications are not required in the contract, the designer should decline to provide them. He should never sign a certification statement pertaining to conditions beyond his knowledge and control. Statements that make the designer a guarantor of another's work should also be avoided since they are not covered by the insurance policies.

The terms of the payment and substantial completion certificates should be consistent with the terms of the design services contract. They should not create an unacceptable or uninsured exposure to liability. To insure that this is true, the designer should have both legal and insurance counsels review the certifications before signing them.[3]

Unless otherwise expressed in the contract, the designer can only determine if the work that the contractor has billed is actually done when processing certificates for payment. The designer has no authority to delay issuing the certificate for payment for other reasons not directly related to the bill. This was the determination of the courts in *Shine v. Hagemeister* (172 N.W. 750).[50]

5.5. Change Orders

There is a widely recognized need in the construction industry to be able to make changes in the project requirements. The design contract is not a "sales" contract. There is no implied guarantee that the plans and

specifications will be perfect. Since the design professional is only held to the legal standard of exercising normal care and skill in designing a project, it is expected that there will be errors and omissions in the contract documents. These deficiencies are not negligent and must be handled expeditiously. Therefore, every well prepared construction contract should have detailed provisions for preparing, executing and documenting changes.[5]

There are many causes of changes during a construction project. The features that are drawn or specified may not be exactly what is required or understood by the owner. The owner's requirements or needs may change. It would be in his best interest to expect some changes of this nature. Changed conditions and unusual weather conditions will almost always cause problems of some sort, resulting in changes. Labor disruptions and defective work are still other causes of changes.[5] The owner will be required to pay for some of these changes, and the contractor others. If the change order process is clear and definite, then most of the changes can be settled through negotiation. A few will still require arbitration or litigation. Minor changes can usually be handled by field orders, but these should be documented as well, for they can sometimes lead to larger changes and disputes.

The change order process should be clearly defined and followed throughout the construction phase. As with each other service, the designer should have his office personnel read and adhere to the provisions of the contract addressing change orders. The owner should be instructed that change orders are to be expected, and do not necessarily imply that someone has been negligent in their performance. The owner should also have his

insurance advisor review and approve all bond forms. The bond provisions should not require that the surety be notified of any changes. The designer should not advise the owner on matters concerning insurance, as this may not be covered by his insurance policy.

The system that is developed for the preparation and processing of change orders should be orderly, utilizing standard forms with sufficient space for essential data, dates, and signatures. When the change order is being processed, the designer should allow sufficient time for revisions to the plans and specifications, including a careful and thorough review. The reasons for the change should be documented thoroughly and carefully, and the reasons should be communicated to the owner in writing so that he is kept up-to-date on all developments. Finally, the change order must not be issued until the owner has reviewed, approved and signed it. If he should then state that the designer was at fault, the designer should immediately inform his insurance company.[5]

5.6. Record Documents

The record documents, or "as builts" as they are commonly referred to, incorporate the significant drawing changes. The preparation of such documents is not included in the basic fee, but can be added to the design services contract if the owner and designer agree. If it is added to the contract, the term "as built" should be avoided in preference to "record documents." The term "as built" connotes perfection, implying that the designer will show the building exactly as it was completed, which is virtually impossible. The party responsible for supplying the information to

develop the record drawings should be specified in the contract, and should be the contractor if possible. The contractor will provide the designer a copy of the working drawings marked up with "red lines" showing the various changes. If the designer must obtain the information himself, extensive observations will be required and should be provided for in the additional compensation.[23] The record drawings themselves, as outlined in the AIA documents, remain the property of the designer. This will prevent an owner from taking the record drawings and using them at another location. If this is done, the second building may develop problems, and the designer could be held liable.

CHAPTER VI

RESOLUTION OF DISPUTES

All of the parties involved in the construction project hope to avoid disputes. However, since the relationships are usually adversarial in nature, and the plans and specifications will contain errors, disputes will arise. The key to resolving disputes is to be fair and to avoid delay in identifying and addressing the pertinent issues. Hopefully the dispute can then be settled without the requirement of third party intervention.

6.1. Claims

Before an issue becomes a dispute, one party makes a claim. *Webster's Ninth New Collegiate Dictionary* lists several definitions of a claim: 1) a demand for something due or believed to be due; 2) a right to something; and 3) something that is claimed. Most claims will be based on the second definition--the designer has performed additional work and has a right to additional compensation, or there were errors and omissions in the plans and specifications and the owner has a right to have them corrected. If the various parties would examine claims from this viewpoint, few would become disputes. Unfortunately, most people will view a claim as a demand for something believed to be due. They will not regard a claim as a right, so the claim evolves into a dispute.

A designer can be notified of a claim against him either directly or indirectly. Directly, he may receive a summons and a complaint, probably meaning that the claim has already evolved into a dispute. The complaint

will outline the basis for the alleged liability and will state the alleged damages. The designer may also receive a demand letter stating, "You owe me because you fouled up. If you do not pay , I will file suit." This claim may not have evolved into a dispute. Regardless of the method in which the designer is notified of a claim, he should immediately initiate dialogue with the party, with consultation with legal counsel, then follow up with definite action. This may relieve the pressure on the other party to file suit.[51]

Indirectly, statements such as, "I am not satisfied with your work," or, "The facility you designed does not work as you said it would. Help me find the problem and solve it," will indicate to the designer that there is potential for a claim. If the designer believes that there is a potential for a claim, he should identify and address the issues as early as possible. He must also remember that inappropriate responses can cause him to assume responsibility, so he should be cautious with what he says. He should examine the potential claimant's personality to determine if he is a chronic complainer, then deal with him appropriately. The designer should then ascertain the magnitude of the problem and his vulnerability to liability. Finally, he should examine the client relations and any political ramifications. It may be best for the designer to admit error, acknowledge liability, and try to limit costs and damages.[51] This solution, though not optimal, is frequently more desirable than allowing the dispute to continue on to litigation or arbitration.

6.2. Litigation

The traditional method for resolving disputes is through litigation--filing suit in court. The popularity of this method is indicated by the fact that suits against designers have increased by 20% per year in recent years. The cost of such disputes has tripled since 1960.[14]

There are several reasons for this tremendous increase in suits. First, new materials are frequently used that are not fully tested, making the injured party more willing to sue. Second, the increasing complexity of construction projects has made it more difficult to determine who is really at fault. The tendency is to sue everyone and let the courts determine who is not at fault. There has also been a definite change in attitudes towards litigation. People have begun to consult with lawyers first when something unexpected happens.[14]

A fourth reason for the increase in suits is the belief that the government should provide protection against everything undesirable, as indicated by the increase in government regulations and class action litigation. This alone has made the cost of construction increase through the difficulties of compliance.[14]

The final two reasons deal with the designers themselves. Designers are trained to solve problems, not litigate. Their methods are open, methodical, and provide many points of vulnerability. Finally, the design profession involves many decisions based on judgement. When these judgements vary from the theory, even though perfectly common and acceptable, a lawyer can emphasize that variance in favor of his client.[14]

Traditionally, law suits involving construction projects were very clear cut. The matters involved in the suit were directly related to the construction process. Very few owners initiated the suits. Design professionals were involved in virtually no litigation. Any litigation in which they were involved was limited to the participants of the construction. In addition, the courts tended to interpret suits with a *caveat emptor* attitude.[9] The design professional could be innovative without worrying about how much liability exposure he was creating.

Today, as previously mentioned, the number of suits has increased, and the nature of the participants has changed. Third parties are now generating a number of suits, not just for damages, but also for stays and injunctions.[9] The courts are now developing the doctrine of "protect the public." Since 1976, the number of suits filed against retired designers has also increased because the theory of "Discovery" rule was applied to the design profession.[14]

6.2.1. Liability

In order to fully understand the litigation process, one must have an understanding of the issue of liability. *Black's Law Dictionary* defines liability as "the condition of being responsible for a possible or actual loss, penalty, evil, expense or burden."[14] Five points must be shown by the plaintiff in order to establish liability of the defendant. First, a duty existed for the defendant to use proper care and attention; second, the proper care and diligence, based on the reasonable person theory, was not exercised; third, the lack of care was the cause of the damages; fourth, the

defendant had no defense in his action or lack thereof; and fifth, the plaintiff suffered damages.[10] The litigation process is the attempt by the injured to prove these five points.

When the design professional is faced with a claim of liability, there are several issues that he should examine. He should first determine exactly what services he agreed to provide. He should then ask himself how a reasonable and prudent designer would have provided those services to determine if he exercised the standard of care and skill. Next, the designer should attempt to identify the specific act or decision that may have led to the alleged injuries or damages. Would the reasonable and prudent designer have made the same decision? Did the acts or omissions of others contribute to the injuries or damages? If others did contribute, were they negligent or otherwise culpable? How much of the damages can be attributed to them? Are they solvent? Finally, how will the jury view the designer's acts, decisions and communications?[51] The answers to these questions should enable the designer to prepare a defense against a liability suit.

6.2.2. Drawbacks of Litigation

The litigation process has been criticized for many reasons such as the high costs and the length of time needed to settle a dispute. A major criticism has been directed toward the decision process used by a judge and jury. It is usually difficult for the jury to understand the relationships on a project, the technical issues, or the standard of care concept when applied to the design profession. As a result, juries may base their decision on the

"likeability" or the appearance of the parties, or they may believe that there will be a cost to the taxpayers if an award is not made. The jury must also make its decision based on expert witnesses who may or may not agree on whether a decision was correct. For these reasons, juries are very unpredictable.[51]

Judges can be equally unpredictable. Part of the problem is that states do not pay enough to get uniformly good calibre judges. If there is a good person on the bench, the quality of judges and juries would be improved, and the cost of litigation would be reduced.[9]

Another major criticism of litigation is the determination of awards. In recent years, juries have been awarding large amounts for noneconomic as well as economic damages. The economic damages can be fairly accurately determined, but there are no established standards for values of noneconomic losses. This is completely determined by the whim of the judge and/or jury. Frequently, the plaintiff will just go for the limit of the defendant's liability insurance. Such exhorbitant awards are very disruptive to the economic climate of society. They have caused the attitude prevalent in society that one should take advantage of every opportunity to gain all one can out of any situation, disregarding standards of what is right or wrong. There is no doubt that one should be responsible for his actions, but the punishment should fit the crime. It is apparent that juries do not consider this maxim when determining damage awards. They also do not realize that the lawyers may be the only winners, for the party who wins the case may have a net loss when all costs are considered.[10] Perhaps with this understanding, noneconomic awards would be limited, as a result, so would litigation.

6.3. Arbitration

An alternate method of dispute resolution that is gaining increased popularity among the parties of a construction project is arbitration. In order to utilize this method, it is required that a clause be included in the respective contract stating that both parties agree to resolve any disputes by arbitration. Arbitration can also be used if both parties agree to arbitrate at the time that a dispute develops. However, this can be risky since one party or the other may feel that they would be at a disadvantage if the dispute is sent to arbitration.

Most standard contract forms will require that all disputes which arise be arbitrated under the rules of the American Arbitration Association's (AAA) Construction Industry Rules. Under these rules, the party demanding arbitration puts his demand in writing and sends the original to the adversary with two copies to the AAA. The respondent is then allowed seven days after a notice from the AAA in which to answer the demands. In contrast to litigation, if the respondent does not answer, then it is assumed that he denies all claims.

The AAA then attempts to find arbitrators satisfactory to both parties. This is frequently done by sending each party a list of seven or more names, allowing them to delete those names which are unsatisfactory, then rank the remaining names. From these lists, the AAA can designate a board of three members that are satisfactory to both parties.[50]

Once the board has been designated and if the contract does not specify a location for the hearings, the AAA designates a location. Next, the

hearings are held wherein both parties present their cases with examination and cross examination, and the arbitrators make a finding.[50]

6.3.1. How Arbitration Differs From Litigation

Arbitration differs from litigation in that it is less formal. The proceedings are not required to follow the legal rules of evidence in form or admissibility. The arbitrators may accept any evidence that they believe to be relevant and material to the case. The arbitrator(s) is(are) not necessarily lawyers or officers of the court. In general, they are neutral persons agreed upon by both parties and who have experience with construction or design. Arbitration proceedings are also not open to the public. Witnesses cannot be compelled to appear unless the authority is granted by state statute.[50]

During the arbitration hearings, both parties may be represented by counsel. The complaining party will present his claims, proofs and witnesses first, followed by the defending party's defense, proofs and witnesses. This can usually be accomplished within a matter of a few days vice the months sometimes required in litigation.[50]

Once both parties have presented their cases, the arbitrators weigh the evidence and make an award. They may grant any award that they deem just and equitable. The decision does not have to be in writing. There is also no requirement that the reasons for the decision be presented. Such decisions are usually final and conclusive, with no right of appeal. Courts may review arbitration decisions, but only to determine that it was free from fraud, within the limits of the issues submitted, and conducted fairly.[50]

6.3.2. Advantages and Disadvantages of Arbitration

In general, arbitration is good. In comparison to court litigation, arbitration is efficient, expeditious, and economical, especially for minor disputes. An arbitration board is usually more qualified to understand the technical aspects of a case since at least one member is an expert in the respective field. A case in court may be decided on legal technical rules rather than the merit of the case as is common in arbitration. Lawyers will play less of a role in the proceedings. Finally, the proceedings can be kept private, so undesirable publicity is avoided.[10]

Despite the many advantages of arbitration, there are some potential disadvantages that must be noted. First, it may be difficult to bring all parties, witnesses, and evidence before the arbitrators, especially if there is no statute authorizing subpoena power. In addition, the waving of rules of evidence may result in injustices. Legal concepts may not be understood by the arbitrators, yet they may be required to decide matters of law as well as fact. Legal principles may then be swept aside.[50] The arbitrators may not make a quick and fair decision, and there is no appeal except to go to court where it will only be determined if the proceedings were fair.[9] Finally, if third parties are involved, arbitration is not usually adequate.[13]

6.3.3. Mediation

An alternate to arbitration that can be used initially in resolving a dispute is mediation. In mediation, one or more individuals assists the disputing parties in reaching a settlement prior to any formal and binding

proceedings. This method can be initiated through clauses in the contract, or by both parties agreeing to the services of a mediator. Mediation is also private, and experts can be called in, but it is not legally binding.[10]

6.4. Statutes of Limitations

A statute of limitation provides a reasonable period of time within which an aggrieved person can bring suit against another. It also establishes a period of time after which the alleged wrongdoer can be certain that no claim can be brought against him. It is "better for the public that some rights be lost than that stale litigation be permitted,"[17] for lack of evidence over time may lead to a miscarriage of justice.[50]

A statute of limitation, under the unavoidable hardship rule, usually begins when the action accrues. However, this has been modified by the "Discovery" rule and the "Continuous treatment" rule. Under the "Discovery" rule, the statute of limitation begins when the defect is discovered. There is a reasonable diligence requirement under this rule. The party injured must investigate if the circumstances indicate that there is a defect. Therefore, the statute of limitation begins when the defect was or should have been discovered.[17]

Under the "Continuous treatment" rule, the statute of limitation does not begin until the professional relationship has ended. This rule was first applied to the medical profession where the patient had to rely exclusively on the care of the doctor. This would be jeopardized if the patient suddenly brought suit against the doctor. If this rule was not used, then the doctor could treat the patient until the statute of limitation ran out and not worry

about being sued. The same theory can be applied to the design profession. The client depends on the designer during the relationship. Should the client bring suit against the designer, the client may receive biased advice to his detriment.[17]

The design professional must be familiar with the statute of limitations in his state since these statutes will have bearing on the length of time that documentation must be retained, as well as future liability insurance coverage.

CHAPTER VII

LIABILITY INSURANCE

Liability insurance is a form of risk spreading that is highly specialized, and can be a major operational expense. In general, there are two main types; comprehensive general liability (CGI) insurance and professional liability insurance (PLI). Comprehensive general liability insurance covers the daily operations of the design firm. For example, CGI would cover injuries to a third person sustained in an accident occurring while the designer was travelling to the project. Professional liability insurance covers the designer in his normal professional activities, such as errors and omissions in the preparation of the contract documents. PLI can also be known as "errors and omissions" insurance.[47]

There are several reasons for carrying liability insurance. First, though it is not required by law, the client may require the designer to carry an appropriate amount of insurance as specified in the contract. Second, the design professional may want to protect his nonexempt assets from being seized should a judgement be issued against him. Finally, the designer may want an injured party to be compensated and made whole for the designer's failure to perform to the standard of care and skill required by law.[47]

The National Society of Professional Engineers (NSPE) was initially instrumental in starting the professional liability program in 1948. By 1956, nearly all of the liability insurance available was carried through Lloyd's of London, but only for about three groups of engineers recognized as qualified. In 1957 the Continental Casualty Company began to furnish liability insurance for NSPE and AIA. However, losses began to occur by

1959 and, in 1962, a premium increase was necessary. In 1964 and 1967, the company revised policies to include such exclusions as services not customary of a designer, subsurface explorations, and boundary surveys.[14] After that time, losses began to increase at a steady rate, and premiums were increased to counteract this increase. Today, the insurance industry is in turmoil. Though many firms have insurance at reasonable costs, an increasing number of firms are finding insurance prohibitively expensive or unobtainable. Consequently, the design professional must be aware of what insurance policies do and do not cover, as well as what options are available if he cannot obtain insurance.

7.1. Types of Professional Liability Insurance Policies

The types of insurance policies can be classified according to the period and type of coverage. Falling into the former classification are "claims made" and "occurrence" policies. The "claims made" policy will cover any claims made during the policy period, including claims for acts or omissions occurring prior to the policy period. The "occurrence" policy will cover any claim made at any time for acts or omissions occurring during the policy period. For example, if an act or omission was made prior to the period of a policy, and a claim is made during the period of the policy, the "claims made" policy will cover the claim while the "occurrence" policy will not. Conversely, if the act or omission occurs during the policy period, but the claim is not made until after the policy has expired, the "claims made" policy will not cover the claim while the "occurrence" policy will. Since the designer's liability for a design may extend past the expiration of his

insurance policy, it is desirable to obtain "occurrence" coverage. However, because of the open endedness and uncertainty of the occurrence coverage, it is not a generally available option for the design professional.[47]

There are two types of coverage; the single professional liability policy and the project liability policy. The single professional liability policy will cover the designer's professional activities for all projects that are being developed. The project liability policy covers the designer's services on a single project. If this type of policy is used, it is advisable for the designer to maintain some type of professional liability insurance to cover services that cannot be attributed to one particular project.[14]

7.2. The Insurance Policy

Most of the policies written by the various insurers are similar in nature. They will begin with a standard insuring agreement, followed by additional declarations that will tailor the policy to the particular design firm. The policy will end with a complete listing of the exclusions that are included.

7.2.1. The Basic Coverage

The basic coverage will begin with the insuring agreement, which is the formal statement made by the insurance company to outline its intent to insure certain risks faced by the respective insured. Such an agreement may read as follows:[37]

> "To pay on behalf of the insured all sums which the insured shall become legally obligated to pay as 'damages' by reason of liability arising out of any negligent act, error, mistake, or omission in the rendering or failing to render professional services of the type described in the declarations, whether committed or alleged to have been committed by the insured or any person employed by the insured or by others for whom the insured is legally responsible."

Following the insuring agreement, the basic coverage will list the additional declarations. These declarations will tailor the agreement to the specific design firm to be insured. First among these declarations is the description of professional services. The description will specifically describe the activities of the design firm, and is an essential element of the insuring agreement. As such it should be complete and accurate since it will outline the services to which the insurance will apply.[14]

Another declaration will be the territory, which defines the area covered by the policy. The designer should review this clause carefully to insure that all of his projects are within the covered area. This is especially true if the designer has work in foreign countries, since many policies will require that all cases be brought within the United States.[37]

Also shown on the declarations page will be the limits of liability, any applicable deductibles, and the premium amount. The limits of liability will normally apply to each claim. More than one claim arising out of a single act or omission will normally be treated as one claim, but this should be specified. The deductible will also be applicable to each claim and will include costs for defense of a claim.[37]

7.2.2. Exclusions

Exclusions are included in the insuring agreement to limit the coverage given by the insurance company. Reasons for exclusions include:[37]

> "1. The insurance company considers the risk uninsurable, such as excavating next to an existing structure.
> 2. The insuring of the risk would be against public policy, as when a moral hazard would be created.
> 3. There are other types of insurance available that more adequately cover the risk, such as automobile insurance.
> 4. It is against the law to insure the risk, such as when fraud or other illegal activities are involved."

The basic coverage will contain exclusions that are standard in all professional liability policies. In addition to these standard exclusions, the insurance company may write in other exclusions for a particular firm or type of work. For this reason, the exclusions should be reviewed carefully.[37]

One major exclusion that policies will include is that of contractural liability, such as hold harmless or indemnity clauses. The risk generated by these clauses will not be covered unless the risk would have been assumed by the designer as a result of reasonable care and skill.[37]

Another important exclusion is for warranties and guarantees. This category includes any expressed warranties or guarantees, estimates of probable construction costs, and provisions requiring the designer to bear cost overruns above initial estimates. The designer should insure that his contract contains no requirements to provide certificates for conditions beyond the designer's control.[37]

Other exclusions will include bankruptcy, failure to provide other insurance, intentional acts, punitive damages, worker's compensation, and provisions requiring the designer to advise the owner on matters of suretyship and insurance. These exclusions can be a guide for the designer when reviewing a potential design services contract.[19]

7.2.3. Premiums

The basic coverage, in the additional declarations, will specify the premiums for the policy. The factors affecting the amount of the premiums include the type of work in which the design firm engages, the experience of the staff, the locality of the work, the gross receipts, the types of contracts that the design firm frequently uses, and the firm's experience record.[47] New firms with little experience history will have higher premiums than an established firm with a good experience record.

Though an individual design firm's premiums will go up should their experience record decline, economic factors will tend to cause premiums across the entire industry to rise. These factors include expanded liability for the design profession, poor underwriting by the insurance companies, declines in the stock market, downturns in the economy, and higher cost for defending claims.[47] When insurance rates are high, the profits from the various investments that the insurance industry made were sufficient to subsidize the low premiums to pay all damages from claims.[21] When the interest rates began to drop and awards continued to increase, the losses could no longer be subsidized. The insurance industry passes any losses on to their insureds, who in turn pass the increased costs on to the consumer.

Unfortunately, the consumer does not realize that he is paying for the increased premiums.

7.3. The Insurance Crisis

In recent months, there has been a major controversy over the liability insurance crisis. The insurance companies have been increasing premium rates at an alarming rate or cancelling policies because of enormous losses. Some people claim that the insurance industry created the crisis to increase profits, while others believe that our legal system is to blame. Regardless of where the blame lies, the crisis is real. Townships, as well as schools and child support centers, have gone out of business, and hospitals have increased rates to pay for increased premiums.[22] The crisis has also reached the design profession. Designers are being forced to seek relief and alternatives in order to stay in business.

7.3.1. Facts on the Crisis

In 1984, there were more than 16.6 million civil suits filed in the state courts, and over 150,000 civil suits filed in the Federal courts. This equates to one case for every fifteen Americans. In 1983 there were 360 cases with million dollar or greater awards.[1] Clearly, the attitude of the public is favorable towards litigation. This attitude is evident in the design profession also, where, in 1984, the claim frequency was 44 for every one hundred firms. The paid claim frequency was only 9.5 for every one hundred firms, meaning that only 20% of the claims filed actually had merit, but the

value of those claims increased by over $40,000 between 1978 and 1984 to an average of $148,480. In addition, the expenses for defending these claims has doubled.[12] As a result, insurance companies are no longer finding it desirable to issue liability policies, and those that are issuing policies have increased premiums dramatically. The average cost of premiums for design firms as a percentage of billings has increased to 2.87% in 1985, up from 2.52% in 1984. Structural firms have been hit the hardest, in that their premiums make up 4.5% of billings.[29]

7.3.2. Alternatives

In the past, when insurance was readily available and premiums were reasonable, design firms were not faced with the problem of finding alternative forms of risk protection. Even today, many design firms believe that the protection provided by liability insurance more than compensates for the higher costs of maintaining that insurance. But what about those firms that cannot afford the higher premiums, or that cannot obtain insurance at all? Because of the insurance crisis, they can now find alternatives. One such alternative is unified risk insurance. This type of insurance is relatively new, and involves all of the parties on the construction project. Insurance costs are generally passed on directly to the owner. The insurance will consist of three policies: contractor's liability insurance; product liability and completed operations insurance; and a construction protection package. The first two policies are not new, but the third type is a new concept in the construction industry. The construction protection package insures all members of the team for

damages resulting from faulty design, construction, and products, and provides insurance on a property basis. All of the parties are members of the same team, so it is like suing oneself should a claim arise. The insurers pay all claims without contesting who is at fault once it has been established that the insured party was damaged by a covered event.[15] This alternative should discourage frivolous suits, reduce defense costs, and reduce award amounts. The project insurance does have some potential disadvantages. If the firm is carrying professional liability insurance, then to carry project insurance would be double coverage. In addition, if the project insurance is with another insurance company, then relations with the usual company may be harmed, something that a designer should be cautious of doing with the insurance crisis.

Another alternative that is being developed by the National Association of Structural Engineers (NASE) is a form of self insurance. The NASE is working to provide national standards of practice, peer review and seminars, and hope to form their own insurance company. They will establish strict standards of performance. Only those firms meeting the standards would be able to qualify for the coverage. They are following an idea first established by the Association of Soil and Foundation Engineers more than 15 years ago.[15]

A third alternative, one which a growing number of firms are taking, is "going bare." With this alternative, the design professional must develop a risk management and loss prevention program to help eliminate the need for the insurance. Though many firms are opting for this alternative, there are some issues that should be considered before letting insurance policies lapse. One of the most important consideration is whether or not the design

firm will be able to obtain work. With the growing tendency of third parties to immediately file suit, using the "shotgun" effect when something goes wrong, many owners are requiring in the contract that the designer carry professional liability insurance. This could eliminate many potential clients for the uninsured designer.

Another issue to consider is the liability threat. Without insurance, the designer could have his personal assets seized in order to satisfy a judgement. Retiring or leaving the employment of the respective firm no longer eliminates the potential liability if a latent defect is discovered at some point in the future. Just when the designer feels that he can rest assured, he could be saddled with a liability suit. If there is no insurance, he could find himself filing bankruptcy.

The designer may not be able to carry his comprehensive general liability insurance if he does not carry professional liability insurance. This may be covered under one of the exclusions of coverage for failure to provide additional insurance. In addition, if the designer decides at some future date to again carry professional liability insurance, he most likely will not be able to obtain coverage against claims during the "no coverage" period.

Finally, though the design professional may have a very effective loss prevention program, that program will not help him on his contracts with subconsultants. The designer has little control over the performance of the subsconsultants, but he is primarily liable to the owner and others for their performance. Even if the claims alleging liability are dubious in nature, they must be defended, and the costs of defending against claims is rising almost as fast as the cost of insurance.[44]

If, given the above considerations, the designer decides to "go bare," he should do so with extreme caution. He should be very selective in the type of project that he agrees to design and the clients with whom he contracts. Though "going bare" may allow some design firms to remain in business, it is a risky alternative at best.

CHAPTER VIII

SUMMARY AND CONCLUSION

8.1. Ethics and the Law

Codes of Ethics have been created to establish moral and professional standards of behavior for the design professional. These Codes do not have a penalty at law, but the courts and the public have begun to recognize the provisions of the Codes as binding. The design professional is expected to perform in the normal standard of care and skill. The duties and responsibilities outlined in the Codes are also expected. These now have a legal impact on the design professional, and penalties at law have been created.

Though the design professional now has a duty recognized by law to perform with a normal standard of care and skill, he is not necessarily liable for damages arising out of his performance. To be liable, the injured must prove that the designer was negligent in his actions or lack thereof. The design professional also cannot be held strictly liable unless he has complete control over all conditions leading to an injury. These maxims are very important to the design professional since the design profession depends on judgements and decisions. If the designer could be held strictly liable, there would probably be fewer designers in the profession.

8.2. Contracting for Design Services

The contract documents are a key element to the success of a design professional. They will outline all of the duties and responsibilities of the owner and the designer. They will also determine the type of relationship that will exist between the designer and the owner: agent or adviser. For these reasons, the contract should be carefully prepared, insuring that all of the elements are present. The appropriate form should be used, and unqualified ambiguous words should be avoided. If the designer questions whether or not to include an item in the contract, PUT IT IN. Finally, before signing the contract, have legal counsel review the contract for potential liability.

There are several types of clauses that should and should not be included in the contract for design services. In the former category, the basic services should be outlined in detail, with explanations of what is intended if there is the possibility of misunderstanding. Provisions for changes and additional services must be included to avoid disputes in the future.

Clauses that should not be included in the contract include cost limitations, guarantees, and warranties. These clauses will not be covered by the designer's liability insurance policy and will cause numerous problems throughout the relationship. Exculpatory language should also be avoided. This type of language will not relieve the designer of liability if he is found to be negligent. Exculpatory language will only cause friction between the owner and designer.

8.3. The Design Phase

The key element of the design phase is client involvement. The designer should insure that the client is kept up-to-date on all aspects of the design. The client will establish the broad design requirements. Therefore, he should make the final design choice. It is the designer's responsibility, as an expert, to advise the client on the advantages and disadvantages of all potential alternatives so that the client may make informed decisions. The designer should also advise the client on costs of the various alternatives, but should not allow this advice to become a cost limitation.

In order to properly advise the client on alternatives, the design professional must keep abreast of new developments in technology and construction methods. If he does not have specific information readily available within his office, the designer should be aware of possible sources such as the Architectural and Engineering Performance Information Center or various design manuals. When using new methods or materials, the designer should insure that they have been fully tested, and that he knows of their capabilities and limitations.

Development of the specifications and the working drawings should begin immediately following selection of the best design alternative and concurrently with each other. The working drawings should be neat and legible. They should be thoroughly reviewed periodically for completeness and accuracy. The type of specification used should be determined by the amount of control and responsibility that the designer wishes to retain over materials and methods. More control means more responsibility for end

performance. The designer cannot tell the contractor how to do something, then hold the contractor liable for the performance.

Regardless of the type of specification used, the designer must properly and clearly specify products and state the basis of evaluation. He should use sufficient language to completely describe the method or material. He should also be careful not to use ambiguous language. If at all possible, use of the "or equal" clause should be avoided since equality is a subjective evaluation. When using reference standards or specifications, the designer should insure that he is using the latest edition and is fully aware of the contents.

Frequently the design professional will require the use of design aids to reduce backlogs within his office. Two such aids are computers and consultants. The use of computers in design is still in its infancy. There are many good software packages available, but they have limitations. Before a designer uses a package, he must be familiar with its operation and capabilities. All packages should be thoroughly checked and certified. However, certification will not relieve the designer of his ultimate responsibility for the design.

Consultants can be used to reduce work loads or to provide expertise that the designer himself lacks. Regardless of the reason for contracting with consultants, the prime designer must remember that he is responsible for the performance of the consultants. Therefore, he should be selective, insuring that the consultants chosen have the required expertise and proper insurance coverage. The designer should then develop a contract that will adhere to the provisions of his contract with the client.

8.4. The Construction Phase

During the construction phase, the designer may act as an agent of the owner. His authority will be limited and should be clearly outlined in the design services agreement. The services, including all duties and responsibilities, should also be outlined in the agreement. The designer should then insure that he, as well as any employees, performs those services in strict accordance with the contract provisions.

Shop drawings should be reviewed completely and thoroughly. Receipt and return of the submittals, along with approval status, should be carefully documented. Approval, if warranted, should be given forthrightly. Exculpatory language in approval stamps should be avoided, as it may imply that the review was superficial.

With the use of new materials and methods, on-site observations are becoming more important. The designer should initially establish with the owner exactly what the term on-site observations will include. This should be outlined in the agreement. The designer should then conduct his visits in accordance with the agreement. He should be sure to make visits at all critical points of the construction. While on the site, the designer should be cautious of what is said, avoiding any discussions that could be interpreted as supervision. Any discrepancies discovered should be thoroughly documented and brought to the attention of the owner and contractor.

All participants in a construction project should expect to encounter changes at some point. When encountered, the changes should be handled expeditiously to prevent delays. An established procedure should be used

that utilizes standard forms. The change should be thoroughly documented and approved by the owner before being issued.

8.5. Resolution of Disputes

The ideal method for resolving disputes is to handle the claim before it becomes a dispute. To do this, the designer should recognize when there is potential for a claim. He should also be aware of the reasons for the increase in claims and disputes, these being the increased complexity of designs, attitudes of the parties towards litigation, and new materials and methods. Should a claim arise, it should be evaluated for its merit, recognizing that the person making the claim may have a legitimate right to additional compensation. If the designer does not automatically assume that the claimer is trying to get something for nothing, more claims could be resolved before they evolved into disputes.

If a claim does evolve into a dispute, the designer should be aware of the alternatives for resolving disputes. Litigation is the most common, but is frequently criticized. Litigation is invariably a drawn out process that will be expensive. It may result in the dispute being settled based on legal issues rather than on the merits of the case. Judges and juries are very unpredictable, and can make awards based on obscure reasons. In addition, awards may be extremely inflated.

An alternate to litigation that is gaining popularity is arbitration. Arbitration is generally more efficient and economical. The arbitrators are experts in the construction field, so will tend to settle a dispute on the

merits of the case. The proceedings can also be private, avoiding publicity that could be harmful to reputations.

Mediation is a method for resolving disputes prior to arbitration or litigation in the life of a claim. When the claim first arises, a third party will sit down with the parties involved in the claim and try to come to an agreement. If the claim can be resolved at this point, a great deal of time and money can be saved.

8.6. Professional Liability Insurance

The design professional should carry two basic types of liability insurance: comprehensive general liability and professional liability. The professional liability insurance has become very expensive or unobtainable due to significant losses in the insurance industry. Therefore, the designer should know what his insurance covers and what alternatives are available. The usual policy will cover professional activities in which the designer normally engages. Policy exclusions will include contractural liability, services not customary to the designer, subsurface exploration, and warranties or guarantees. The insurance company can include additional exclusions if it so desires, so the design professional should review his policy carefully.

If the designer cannot obtain professional liability insurance, there are a few alternatives. Two alternatives are project insurance or self insurance. These alternatives are fairly new. The riskiest alternative is to "go bare," trusting that a risk management program will be effective in eliminating liability risks.

8.7. Conclusion

Recently there have been many occurrences that have brought the issue of professional liability to the forefront of the design profession. The insurance industry is in turmoil, with a growing number of design firms finding professional liability insurance either prohibitively expensive or unavailable. Insurance companies are cancelling or declining to renew policies, forcing designers to look elsewhere or "go bare." Courts are awarding inflated awards based on ability to pay rather than degree of negligence. Owners are requiring designers to carry more insurance or indemnify them for the actions of all parties. As a result, the relationships between the parties of the contract have become adversarial, with each person trying to place risks on the other parties and reduce the liability exposure that they experience.

The primary methods that many designers have used to reduce liability risk exposure is shifting the risks through exculpatory language, indemnification clauses, and limits on responsibility and liability. These methods have been ineffective since the designer will not be relieved of liability for his own negligence. The only way for the design professional to reduce his liability risk exposure is to produce a quality product and perform at or above the normal standard of care and skill. He must obey all laws and develop a risk awareness program or loss prevention program that will assist him in improving his services. The designer should also remain current with advances in technology and changes in the standard of care and skill that will be expected of him. Resources such as continuing education, conferences, societies, and reports such as this one, will allow the design

professional to identify liability issues and adjust his services accordingly to reduce his exposure to the risks involved in the design profession.

REFERENCES

1. Allaire, B.R., "An Insurer's View," *Florida Engineering Society Journal,* vol. 39, no. 4, November, 1985, pp.15-16.

2. Ayers, C., *Specifications: For Architecture, Engineering, and Construction,* McGraw-Hill Book Company, New York, New York, 1975.

3. "Certifications," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. IV, no. 12, 1975.

4. Chance, C.B., Judge, Circuit Court, Eighth Judicial Circuit, in an interview conducted on 9 June 1986.

5. "Change Orders," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VI, no. 9, 1976.

6. "Client Selection," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. I, no. 9, 1971.

7. Dunham, C.W., R.D. Young, and J.T. Bockrath, *Contracts, Specifications, and Law for Engineers,* McGraw-Hill Book Company, New York, 1979, pg. 139.

8. Ellison, M.B., "To Write or Not to Write," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. I, no. 6, 1971.

9. "Exploratory Study on Responsibility, Liability, and Accountability for Risks in Construction," Committee on Responsibility, Liability, and Accountability for Risks in Construction, The National Research Council, National Academy of Sciences, Washington, D.C., 1978.

10. Firmage, D.A., *Modern Engineering Practice: Ethical, Professional, and Legal Aspects,* Garland STPM Press, New York, 1980.

11. *12 Florida Jur 2d,* Contribution, Indemnity, and Subrogation, Lawyers Co-Operative Publishing Company, 1979, with Supplement issued January, 1986, pp 19-31.

12. Genecki, P., "Yesterday and Tomorrow," *Florida Engineering Society Journal,* vol. 39, no. 4, November, 1985, pp.12-14.

13. Holden, C., of Holden, Murphy &Eubank, PA, in an interview conducted on 20 May 1986.

14. Holland, J.P., "Professional Liability of the Architect and Engineer," *Journal of Professional Issues in Engineering,* vol. 111, no. 2, April 1985, pp 57-65.

15. "Insurance Remedies Proposed," *Florida Engineering Society Journal,* vol. 39, no. 4, November, 1985, pg. 13.

16. Jabine, W., *Case Histories in Construction Law: A Guide for Architects, Engineers, Contractors, Builders,* Cahners Publishing Company, Inc., Boston, 1973.

17. Jensen, W.E., and F.P. Land, "Potential Malpractice Liability of Civil Engineers," *Journal of Professional Issues in Engineering,* vol. 109, July, 1983, pp 170-184.

18. Kornblut, A.T., "Changing Standards of Liability and Contractural Pitfalls," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. XIV, no. 1, 1984.

19. Kornblut, A.T., "Contracts for Architectural and Engineering Services," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc.,vol. VII, no. 3, 1977.

20. Lewis, J.R., *Construction Specifications,* Prentice-Hall, Englewood Cliffs, New Jersey, 1975.

21. "Liability Insurance in Turmoil," *Engineering News Record,* vol. 213, no. 23, 6 December, 1984, pg. 64.

22. Lunch, M.F., *The Liability Crisis: A White Paper,* Professional Engineers in Private Practice, Legislative and Government Affairs Committee, National Society of Professional Engineers, Alexandria, Virginia, 1985.

23. "Management Alerts III," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VII, no. 2, 1977.

24. "Management Alerts IV," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VII, no. 10, 1977.

25. "Management Alerts V," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VIII, no. 2, 1978.

26. Manheim, C.M., "Do's and Don'ts for the Design Professional," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc.,vol. II, no. 5, 1972.

27. Marks, R.J., R.J.E. Marks, and R.E. Jackson, *Aspects of Civil Engineering Contract Procedure, 3rd Edition,* Pergamon Press, New York, 1985.

28. Orenstein, G.S., "Instant Expertise: A Danger of Small Computers," *Civil Engineering/ASCE,* vol. 54, no. 6, June, 1984, pp 50-51.

29. "Professional Liability Insurance Facts," *Florida Engineering Society Journal,* vol. 39, no. 4, November, 1985, pg. 17.

30. "Professional Service Contracts," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VI, no. 5, 1976.

31. Pulver, J.W., "Computer Bound," *Civil Engineering/ASCE,* vol. 54, no. 6, June, 1984, pp 68-69.

32. "Quality Control in Performing Expanded Services," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. III, no. 4, 1973.

33. "Quality Control in the Preparation of Specifications," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. I, no. 5, 1971.

34. "Quality Control in the Preparation of Working Drawings," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc.,vol. I, no. 2, 1971.

35. Roberts, K.E., "Obligations of On-Site Observations," *Guidelines for ImprovingPractice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. II, no. 9, 1972.

36. Robin, S., and J.R. Syrnick, "Protecting Your Firm Against Liability Claims," *Civil Engineering/ASCE,* June, 1975, pp 66-69.

37. Rodriguez, A.P., "Is the Risk Insurable?," *Journal of Professional Activities,* vol. 107, no. EI4, October, 1981, pp 281-287.

38. Rosen, H.J., *Construction Specifications Writing: Principles and Procedures,* John Wiley & Sons, Inc., New York, 1974.

39. Rubin, R.A., and E.H. Goldberg, "The Case of the Bungled Bridge Rehab," *Civil Engineering/ASCE,* June, 1984, pp 43-45.

40. Rubin, R.A., and M.L. Ressler, "Shop Drawing Review: Minimizing the Risks," *Civil Engineering/ASCE,* March, 1985, pp 68-70.

41. Saether, K., H.R. Sandberg, and C.F. Beck, "Reliability of Computer Aided Design," *Journal of the Technical Councils of ASCE,* vol. 105, no. TC2, December, 1979, pp 371-384.

42. Samaras, T.T., *Engineering Graphics Desk Book,* Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1975.

43. Scott, R.F., "Software Certification: Forseeing Problems," *Civil Engineering/ASCE,* vol. 55, no. 2, February, 1985, pg. 6.

44. Shivler, J.F., "The Risks of Going Bare," *Florida Engineering Society Journal,* vol. 39, no. 4, November, 1985, pp 18-19.

45. "Shop Drawings," *Guidelines for Improving Practice: Architects and Engineers Professional Liability,* Office for Professional Liability Research, Victor O. Schinnerer & Company, Inc., vol. VI, no. 3, 1976.

46. Smith, J., of CH2M Hill Consultants, in an interview conducted on 11 June 1986.

47. Sweet, J., *Legal Aspects of Architecture, Engineering, and the Construction Process, 3rd Edition,* West Publishing Company, St. Paul, Minnesota, 1985.

48. Vansant, R.E., "Liability: Attitudes and Procedures," *Journal of Professional Issues in Engineering,* vol. 109, October, 1983, pp 276-281.

49. Vaughn, R.C., *Legal Aspects of Engineering, 4th Edition,* Kendall/Hunt Publishing Company, Dubuque, Iowa, 1983.

50. Walker, N., E.N. Walker, and T.K. Rohdenburg, *Legal Pitfalls in Architecture, Engineering and Building Construction, Second Edition,* McGraw-Hill Book Company, New York, !979.

51. Wereszczynski, J., "Professional Liability Strategies," *Consulting Engineer,* October, 1984, pp 85-89.

DUDLEY KNOX LIBRARY
NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA 93943-5002

218741

Thesis
G14234 Gamble
c.1 Liability issues of
the design profession.

218741

Thesis
G14234 Gamble
c.1 Liability issues of
the design profession.

thesG14234
Liability issues of the design professio
3 2768 000 67033 5
DUDLEY KNOX LIBRARY